SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION. ART. SCIENCE. MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XLIII.—No. 5. [NEW SERIES.] NEW YORK, JULY 31, 1880. [$3.20 per Annum. [POSTAGE PREPAID.]

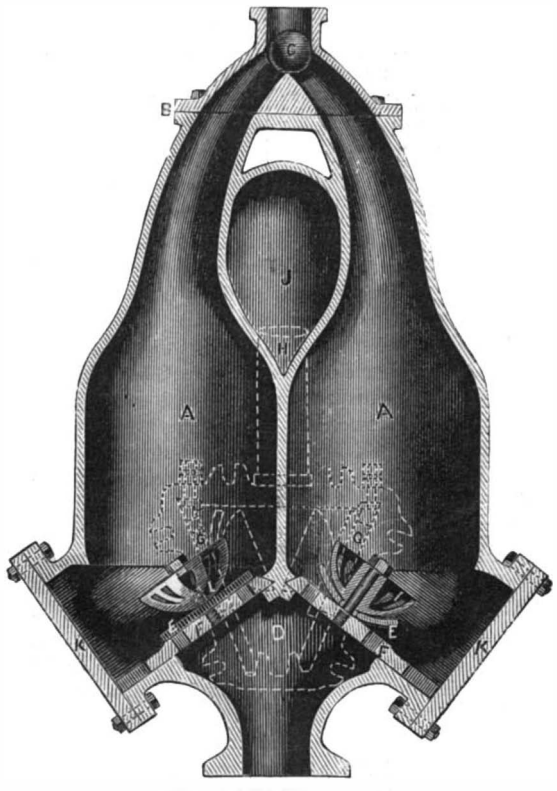


FIG. 1.—SECTIONAL VIEW.

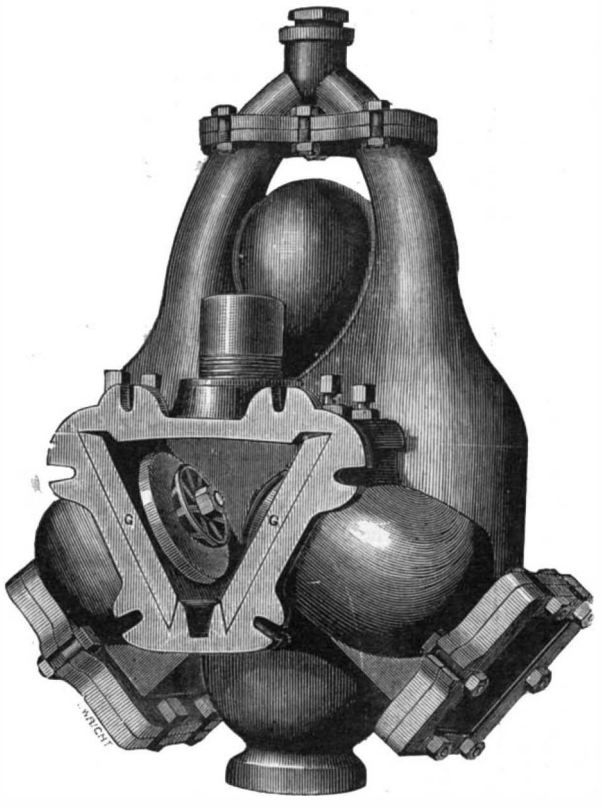


FIG. 2.—SHOWING DISCHARGE CHAMBER WITH COVER REMOVED.

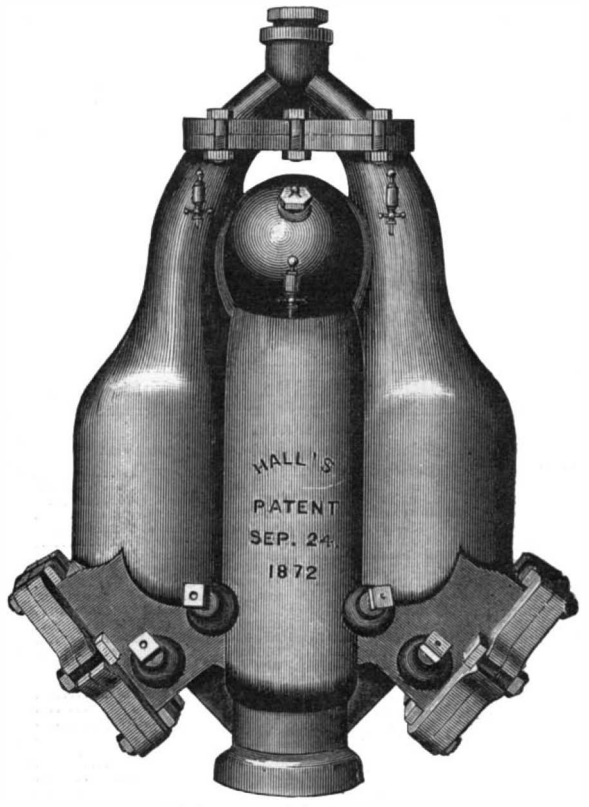
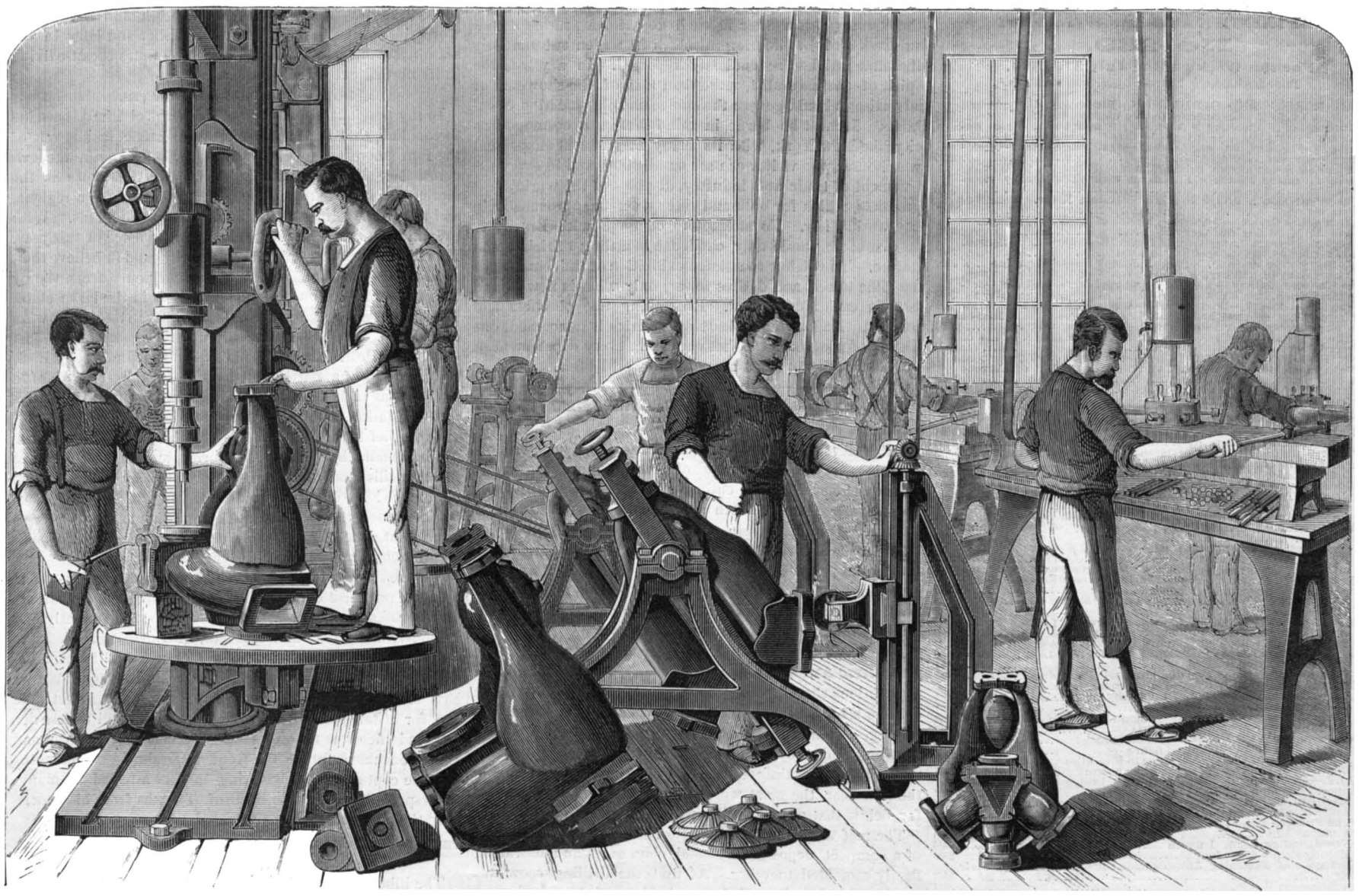
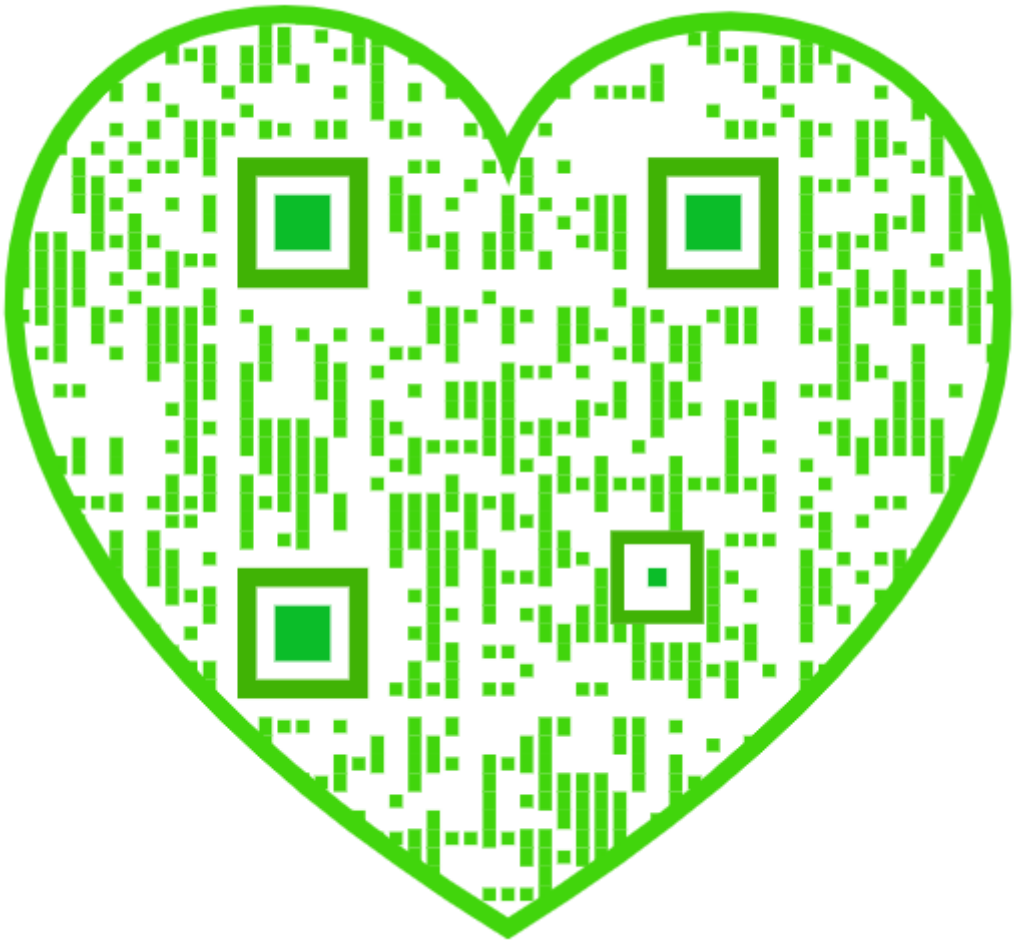


FIG. 3.—FRONT VIEW.



MANUFACTURE OF PULSOMETER PUMPS.—PULSOMETER STEAM PUMP COMPANY, NEW YORK.—[See page 69.]

© 1880 SCIENTIFIC AMERICAN, INC



Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included..... **$3 20**
One copy, six months, postage included **1 60**

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address
MUNN & CO., 37 Park Row, New York.

☞ To Advertisers.—The regular circulation of the SCIENTIFIC AMERICAN is now **Fifty Thousand Copies** weekly. For 1880 the publishers anticipate a still larger circulation.

The Scientific American Supplement

Is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of *seven dollars*. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 37 Park Row, N. Y.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, $5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. ☞ Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 37 Park Row, New York.

NEW YORK, SATURDAY, JULY 31, 1880.

Contents.

(Illustrated articles are marked with an asterisk.)

Acid, picric, and adulterations...	72	Knife, table, new*...	68
Agricultural inventions.....	69	Leather carp, the*.....	71
Air, the, breathed in Leadville..	74	Man who ran first locomotive....	68
Alcohol, poisonous effects of. ...	74	Mechanical inventions.....	66
American Chemical Society.....	65	Medical lakes of E. Washington.	74
American industries*.....	69	Mirrors, silvering of.....	73
American Philological Associa'n.	68	Motor, steam, novel*.....	66
Anthracite, steamer, the.....	68	Oil tanks, more fired by lightning	65
Army worm, notes and obs..	64	Philosophy, Concord school of...	68
Astronomical notes	74	Picric acid and its adulterations.	72
Atmosphere, what it contains...	72	Plate, spurious, hall marks on...	72
Banana fiber....	67	Potters' machinery, prizes for...	69
Bath for acid solution (3).....	75	Prizes for potters' machinery....	69
Bones, monster*.....	71	Profilograph, the*.	66
Brick tea....	68	Pulsometer pumps, manuf. of*.63	69
Burns, treatment of.....	72	Pumps, pulsometer, manuf. of*63	69
Car wheels, securing to axles*..	70	Railroad cars, running*.	70
Cars, railroad, running*.	70	Raisin wine.....	69
Closets, improved *.....	67	Salt, use of in a dry time.....	73
Concord school of philosophy....	68	Scissors, New Jersey in Sheffield.	73
Courage necessary to success....	74	Sharks, do they harb. their young	72
Cows, our, and their value.....	73	Silvering of mirrors.....	73
Cure for drunkenness, Unger's..	73	Spy-glass, novel, a.....	68
Diamond Reef, removal of.....	64	Stains, to remove from silk (1)....	75
Electric light experiments.....	74	Staten Island and oysters.....	65
Epidemic at Adams, Mass.....	69	Steamer Anthracite, the.....	68
Etching acid (2).....	75	Straw thrashing in California....	67
Etching ground (2).....	75	Sugar refineries, our.....	70
Fair, World's, of 1883	64	Swamp muck, value of.....	69
Flowers, changing the color of...	72	Table knife, new*.....	68
Give the boys tools	67	Tanneries, Pennsylvania.	73
Glaciers, South American.....	74	Tea, brick.....	68
Hotbeds made by ants.....	72	Tools, give the boys....	67
Industries, American *	69	Treasure wagon, a.....	73
Insects, to drive away (?).....	75	Velocipede, new*.....	67
Inventions, agricultural.....	69	Wagon, treasure, a.....	73
Inventions, mechanical.....	66	Wine, raisin.....	69
Inventions, miscellaneous.....	67	World's fair of 1883.....	64
Inventions, new	70	Worm, army, notes and observa..	64

TABLE OF CONTENTS OF
THE SCIENTIFIC AMERICAN SUPPLEMENT
No. 289,
For the Week ending July 31, 1880.

Price 10 cents. For sale by all newsdealers.

PAGE

I. ENGINEERING AND MECHANICS.—Disconnected Compound Engines. 1 figure. Disconnected paddle engines, Rankin's system. 3799
Progress of Engineering in America. Water works.—Canal Engineering. — Railways. — Bridges. — River improvements.—Ship building.—Telegraphic engineering.—Gas engineering.—Metallurgy.—Agricultural Engineering 3799
The New Scandinavian Driving Band. Paper by W. WILSON COBBET, London Foremen Engineers, with discussion by members 3800
The Plattsmouth Bridge over the Missouri River. Details of construction 3801
Temporary Bridges. 2 figures. Model of temporary bridges.—Bouilliant's Cut Log Fastener 3802
Sectional Steam Launch for African Exploration. 2 figures. Horizontal and vertical sections, to scale..... 3802
Carpet Sewing Machine. 1 figure. Joseph Hesse's machine 3802
The Sinking of Railways in Bogs. On New York, New Haven, and Hartford Railway.—Monticello and Port Jervis Railroad.—Jefferson Branch, Erie Railway.—Whitehall and Plattsburg Railroad. 3803
English Railways.—Local terms.—A passenger train.—A first-class carriage.—Second and third class carriages.—The guard of the passenger train.—Presto, change!—The engine driver..... 3803
The Austrian Lloyd's Arsenal at Trieste. 1 figure. Plan of Arsenal 3804

II. TECHNOLOGY AND CHEMISTRY.—Development of the Latent Photographic Image. By M. CAREY LEA. Action of Ferrous Salts..... 3807
Transfer of Negatives..... 3807
Developing Gelatine Plates..... 3808
Siemens-Martin Steel. By SERGIUS KERN..... 3808
The Behavior of Sulphureted Hydrogen with the Salts of the Heavy Metals. By H. DELFFS..... 3808
Determination of Zinc. By W. ALEXANDROWICZ 3808
Methyl Chloride. Uses of methyl chloride.—Preparation of methyl products 3808
Determination of Chlorine. By G. VORTMANN..... 3809
Analyses of Some Hair Dyes. By J. F. BRAGA..... 3809
Nascent Hydrogen..... 3813
Non-Poisonous Colors..... 3813
Carbonic Acid in the Air..... 3814

III. ELECTRICITY, MAGNETISM, ETC.—Theory of the Galvanic Current..... 3805
On an Automatic Mercurial Pump. By M. G. COUTTOLENE..... 3806
Theory of the Microphone. Prof. Challis's theory..... 3806
Interesting Electrical Researches. Dr. Siemens on recent applications of the dynamo-electric current to metallurgy, horticulture, and the transmission of power 3806
On the Electrolytic Determination of Steel. By LUDWIG SCHICHT 3808

IV. HYGIENE AND MEDICINE.—Scarlet Fever. Lecture by Dr. Alonzo Clark, College of Physicians and Surgeons, New York.... 3809
Treatment of Whooping Cough with Atropia used hypodermically and Carbolic Acid Inhalations. By Dr. WM. LEE, Baltimore 3810
Undulatory Nervous Action..... 3811
Variations of Urea in Cases of Phosphoric Poisoning..... 3813

V. NATURAL HISTORY, ETC.—The Winner of the Derby, 1880. 1 figure. Bend Or, the winner of the Derby..... 3811
Delaware Eels..... 3811
Honey Wasps and their Nests. 1 figure. Nests of honey wasps. 3812
The Jardin d'Acclimatation of Paris..... 3812
Experiments in the Use of Liquid Manure 3813
Tuckahoe, or Indian Bread. 1 figure 3813
Intermittence of Phosphorescence in Fire Flies..... 3814
Digestion of Food by the Horse when at work. By E. V. WOLFF 3814

VI. ART.—Book Cover in Leather Mosaic Design of Ihne & Stegmuller. By Collin, Berlin. 1 figure, half size..... 3807

VII. MISCELLANEOUS.—Crystalline Form of Magnesium 3802
Antisepticity of Copper 3802
The Prussian Patent Office 3805
A Patent Age..... 3805
New Sounding Lead. 1 figure..... 3805
Melting Points of Nickel 3806
Influence of Fattening Animals upon the Constitution of their Fats..... 3807
A Pompeian House..... 3814
The Emmet County Meteorite 3814
Native Cotton Goods of China..... 3814
North Pole Observations..... 3814

THE WORLD'S FAIR OF 1883.

The Secretary of State has appointed August 10 for the first meeting, in this city, of the Commissioners of the proposed International Exhibition. The resident commissioners held a meeting July 13, to appoint committees to arrange for the general meeting. The main purpose of the meeting of August 10 will be to form a temporary organization of the commission, and to provide for the opening of books of subscription for the capital stock, as required by act of Congress. The capital stock is fixed at $12,000,000, and $1,000,000 must be subscribed and $100,000 paid in before any further steps can be taken.

The subscription books are to be kept open sixty days; then the commissioners will reassemble for the election of permanent officers. The first meeting of the shareholders will be called at the same time, to elect from their number a committee of finance, to consist of twenty-five members. Not until then—say October 11, next—can any action be taken with regard to the classification of exhibits, the appointment of judges, examiners, and other officers, the selection of a site, and so on.

There is no reason to anticipate any difficulty or delay in raising all the money needed to make the coming Exhibition great, successful, and entirely creditable to our city and the nation. The selection of capable heads for the several departments may be less easy, but among our many able and experienced business men it ought not to be very hard to find the right man for every place. Though a dozen or more possible sites have been proposed, it is obvious that the choice must lie between two or three which alone present the requisite conditions—ample space, nearness to the heart of the city, easy accessibility by land and water, high, wholesome, and well drained ground, and suitability for the reception of permanent buildings.

The determination of the scope and character of the Exhibition involves many problems of a serious, delicate, and conflicting nature. What is wanted is not the biggest possible show, but the best. It must be understandable as well as large and inviting. The danger is that it will be too big and too chaotic to be intelligible, and bewildering because of the multiplicity of indistinguishable exhibits. Every exhibitor will naturally want to show all that he has to sell, to display the magnitude of his own establishment, regardless of the fact that twenty other men in the same line have an equal right and an equal desire to show the same things; regardless too of the fact that the visitor's time, strength, and patience are necessarily limited.

In deciding upon what should be shown some principle of exclusion will have to be adopted, both to keep the Fair within reasonable bounds and to secure a proper classification of exhibits; and it might be well at the outset to rule out, so far as possible, everything, however worthy, if it cannot show or illustrate an advance upon what was exhibited at Philadelphia, either in the article itself or the method of its production. If this should threaten the exclusion of many staple products of high commercial importance, provision might be made for them in special representative collections, to show in a compact and intelligible way the best the country has to offer in each department, rather than a succession of bewildering displays in which substantially the same articles are endlessly repeated. In a word, the spirit of the naturalist, more than that of the showman or advertiser, should govern the choice and classification of exhibits. It must be borne in mind that in a cosmopolitan city like New York, with its many magnificent shops and warehouses, the visitor can see on all sides, and in every department of trade and industry, displays of the world's best products, which for bulk and variety are unapproachable in any world's fair. To attempt to compete with Broadway on that score would only challenge belittling criticism and failure. The visitor to a stated exhibition of universal scope has time to see, and desires to see, only what is newest and best in each department. Everything else obscures and wearies. And, so far at least as America is concerned, one decade of progress furnishes enough in every department of human activity to stock a creditable world's fair.

THE REMOVAL OF DIAMOND REEF, NEW YORK HARBOR.

After eleven years of persistent work the four acre obstruction to the commerce of our harbor, known as Diamond Reef, has been entirely cleared away, so as to give over the whole area a depth of twenty-six feet of water at low tide.

The reef was first attacked over twenty years ago, but no substantial progress was made toward its removal until the invention of General Newton's steam drilling scow, after the improvement of the East River channel was undertaken by the United States Government.

An extended description of the work was given in the SCIENTIFIC AMERICAN just a year ago, with a number of illustrations showing the construction of the Government drilling scow and the methods of using it in submarine mining. Thanks to the efficiency and economy of this invention, and the saving effected by the system of deep water hydraulic mining, introduced by General Stone during the past year, the great work has been carried out at a cost far below that of any similar work elsewhere.

The reef was composed in part of hard rock, but mainly of a compact deposit of glacial clay, sand, and bowlders, firmly cemented together. At first the drilling scow was employed in blasting off the projecting points and edges of the rock, so as to secure a channel of moderate depth over all the reef. Latterly a system of face blasting has been carried out, to insure a complete removal of all the rock down to the required depth, the fragments dislodged being raised by grappling. To remove the bowlder drift a different process was found necessary. Though not so hard as rock the cemented drift was more troublesome, the drill bars glancing on the hard bowlders, and the exploding charges of dynamite blowing out without greatly disrupting the body of the reef. To meet these difficulties General Stone devised his system of hydraulic mining under water. By means of powerful streams of water from a force pump, one stream being directed against the face of the reef, the other turned in the opposite direction so as to cause a strong current to carry away through a pipe the earth and stones stirred up by the first stream, it was found comparatively easy to wash away rapidly the lighter materials of the reef and convey them into deep water. The heavier bowlders were at the same time detached from the glacial clay and sand, so as to be readily grappled and removed in the ordinary way.

NOTES AND OBSERVATIONS ON THE ARMY WORM.

BY C. V. RILEY.

The appearance of this insect in the Atlantic States this year has been marked by several peculiar conditions, and further study of its habits has revealed some new points which enable me to recast the theories which have been proposed in explanation of the phenomena connected with it.

NUMBER OF ANNUAL GENERATIONS.

From the time Fitch wrote so fully on the species in 1861 until the record of my observations made in 1876, it was the prevailing belief among entomologists that there was but one annual brood of the species, especially in the Northern States, no absolute evidence of a second brood having been obtained. My experiments that year proved conclusively that there were always two, and sometimes three, generations in the latitude of St. Louis. The fact that I also recorded as to the remarkably rapid development of the worm, *i. e.*, that it can reach full growth within a fortnight after hatching, lent favor to the idea, in my mind, that there might be even more generations. Subsequent experience, and especially that of the present year, has convinced me that there is usually one other generation in the latitude indicated, and it is but natural to suppose that there are still more in more Southern latitudes. The moths are to be found laying their eggs as soon as vegetation starts in the spring, and there is a succession of broods from that time until winter sets in, the number differing according to latitude and the length of the growing season. Thus Prof. Comstock reports it as having been received at the Department of Agriculture in the larva state during every month of the past winter, from the Southern States, where, during the mild weather, it was active and injurious to oats and other grain.

There is no doubt that the prevailing theory of its single-broodedness was a result merely of the fact that it is observed in excessive numbers only once during the year, and usually when wheat is just about ripening. But, as I showed in my Missouri Reports (Eighth and Ninth), the worm is always to be found both earlier and later in the season, and attracts no attention at such times because living in its normal cut-worm condition.

HOW THE INSECT HIBE NATES.

In my previous discussions of this subject I have been led to conclude that the insect might hibernate in any one of the four stages of egg, larva, chrysalis, or moth, the evidence then at hand pointing to the chrysalis state as the more normal mode of hibernation in the northern regions, and the moth or imago state in the southern regions. With present light, and especially with the experience of this year, I am led to revise my opinions materially, and to believe that, as in the case of so many of our ordinary cutworms, the by far more common mode of hibernating is in the larva state. That the insect does hibernate in the larva state is now an established fact, based not only upon the experience just cited from Prof. Comstock, but upon the finding by Prof. S. A. Forbes of a partly grown larva in the stomach of a blue-bird as early as March the 9th, at Normal, Ill., or before vegetation could have fairly started.

The belief is further confirmed by the lateness of the season in which I have found the worms, and by the finding of the chrysalis and breeding of the moth by Mr. Meske, at Albany, N. Y., about the middle of May.* We have absolute evidence, therefore, of the hibernation as larva and as a moth; but none of hibernation either in the egg or chrysalis state, though presumptive evidence of the latter.

We are slow in getting at the simple truths in respect to many of our most common insects, because the original observers are so few compared to those who write fluently and copiously at second hand, and can, of course, never add to our knowledge of the facts. The fact of larval hibernation established, gives us at once a better explanation than we have hitherto had of many experiences with the insect. We can, for instance, at once see why the worm will be less disastrous in fields or meadows that have been burned over, and also at once account for the frequent freshness of the moths that are captured in early spring—a fact attested by many, and especially insisted on by Prof. Thomas from his experience the present spring, as narrated to me.

THE DESTRUCTIVE GENERATION PROBABLY NOT THE FIRST OF THE SEASON.

The hibernation of the larva being admitted, it follows, in

*Cited in the 8th Missouri Report, p. 44.

© 1880 SCIENTIFIC AMERICAN, INC

my mind, that the injurious brood will be that succeeding the hibernating one; *i. e.*, the resultant from the moths which the hibernating larvæ produce. Passing the winter, in different sizes, under the shelter of matted leaves, in unpastured meadows, in grass fields, and in grain fields sown in the autumn, these worms will go through their transformations and produce moths soon after vegetation starts. The moths will show little tendency to leave the fields where they were bred, but will lay their eggs in such fields, and under favorable conditions their issue may, as during the present year, become so abundant as to be obliged to travel therefrom when approaching full growth.

There are some other interesting questions, as the relation of wet and dry weather to army worm increase, etc., which I will present in a future article.

MORE OIL TANKS FIRED BY LIGHTNING.

On the 14th of July a terrible storm with thunder and lightning passed over the neighborhood of Bradford, Pa., and as usual quite a number of oil tanks were struck and their contents burned. Property to the amount of half a million dollars is reported as having been destroyed. One stroke of lightning fired a 25,000 bbl. iron tank full of oil, at Custer City, near Bradford, belonging to the United Pipe Lines. Another large tank at Kansas Branch was struck and burned. Tank 367, containing 25,000 bbls., on Lewis Run, was also struck and burned.

At Coleville, a 250 bbl. tank was struck and burned, the flames spreading to other tanks. At Kendall Creek, two wells were struck and 600 bbls. oil consumed. At Sawyer City a well was struck and 250 bbls. oil destroyed. At Red Rock two oil rigs and 100 bbls. oil were struck and burned. The burning oil from the Custer City tank spread to adjoining tanks and great destruction of property ensued. This is a sad catalogue for one storm.

We recently called attention to the remarkable fact that lightning seems to make a special selection of oil tanks as objects for destruction. Almost every thunderstorm that sweeps over the Pennsylvania oil regions sets oil in a blaze somewhere; but up to the present time no observation seems to have shown exactly how these conflagrations are induced or what the remedy is.

We have heretofore presented two theories: 1. That the light hydro-carbon vapors from the oil, rising high in the air above the tank, form a conductor which the lightning follows into the tank and ignites the gas. (See SCIENTIFIC AMERICAN of July 3d and 17th.) 2. That the lightning strikes or is discharged from the iron supply pipe of the tank, at a greater or less distance from the latter, whereby a spark is induced within the tank, between the supply pipe and the iron casing of the tank. The most minute spark of electricity thus appearing in the tank would set fire to the oil, as the end of the supply pipe terminates above the oil, in an atmosphere of highly inflammable gas. If this theory is correct, and it looks reasonable, one remedy would consist in making an electrical connection between the oil supply pipe and the iron casing of the tank. This can readily be done by means of half a dozen short pieces of wires, or strips of copper, the respective ends of the copper being soldered to the outside of the iron casing of the tank and to the exterior of the supply pipe. It might be supposed that if the iron supply pipe is in contact with the iron casing of the pipe, no further connection would be necessary, which is very true. But if there is rust, or a film of oil, between the pipe and the casing, then the contact would not be perfect, a spark might result, and the gas be set on fire. We therefore advise tank owners to make use of soldered connections, done in the most thorough manner as we have indicated.

It is alleged that the use of lightning rods, arranged on masts near the oil tanks, has proved ineffectual. But we have seen no particulars of the manner in which such rods are grounded. If their terminals were simply stuck down a few feet into dry earth—which is the way most of the good-for-nothing rods are arranged—then of course no protection could be expected. If their terminals were soldered to iron underground pipes which were directly connected with the tanks, the protection might be secured.

The value of any lightning rod as a protector chiefly depends upon its being well grounded, or in other words thoroughly connected with the earth. One of the best groundings for a lightning rod is an iron water or gas pipe, which extends for a long distance underground, and thus affords an extensive conducting surface between the rod and the earth. The bottom of the rod should be soldered to such iron pipe.

THE AMERICAN CHEMICAL SOCIETY.

The June conversazione of the society was held with Dr. C. F. Chandler, at the School of Mines, Columbia College, New York, on Thursday evening, June 20.

A large attendance answered Dr. Chandler's invitation, and a pleasant time was spent examining a number of new additions to the Chemical Museum of the School of Mines.

Among the most interesting of the objects exhibited was a collection of the celebrated Arita porcelain from Japan. This material is true porcelain, made by the admixture of two natural clays found in Japan, without any preparation or other material. It is susceptible of being worked into the most delicate and artistic forms, and is decorated with all the beautiful and curious skill so characteristic of the Japanese.

Dr. Chandler explained the elaborate fittings recently put into the chemical lecture-room of the School of Mines for experiments with the electric light. These are so arranged that the room is lighted with two electric lamps suspended from the ceiling and inclosed in opal glass globes; while by means of an ingeniously devised switch at the side of the lecture table, these lamps can be thrown out of the electric circuit, and at the same instant the current is diverted to the experimental lantern to project objects upon the screen. The advantage of this arrangement is that the sudden change from the electric light of the experimental lantern to gaslight, as ordinarily arranged for lecture rooms, is obviated, and there is no sudden strain upon the eyes.

The electricity is obtained from a Wallace dynamo-electric machine, located in the engine room of the school, which machine is driven at a speed of about eight hundred revolutions per minute. Eight wires run from the different parts of the machine to the switch board in the chemical lecture room, thus giving the means of throwing out or using any desired combination of parts.

With the lantern Dr. Chandler made a number of experiments in spectrum analysis, showing the lines of silver, copper, zinc, and the reversing of the sodium line. He also showed the effect of the change of form in the slit of the lantern, by using Dr. Henry Morton's admirable contrivance to form round disks, circles, and zigzag lines of the spectrum on the screen.

Some examples of the beautiful artotype process of photo-printing were exhibited, and much admired for their near approach to ordinary fine photographs, experts only being able to detect that they are printed.

A very fine and large photograph of Lanyumantel's picture of the arrest of Lavoisier by the officers of the French Revolution, was much admired.

Among a number of other minor objects exhibited were some old hand blocks used in calico printing. Dr. Chandler said he had visited a print works where he found a cord of such blocks stored away among some rubbish, and he secured some of them as relics of a process which is rapidly becoming obsolete, being superseded by the more modern process of machine printing.

STATEN ISLAND AND OYSTERS.

From the log or bark canoe, that once carried the savages, to the commodious and elegant steamers of to-day, is a great step. Yet such is the change since 1524, when Giovanni Verazzano entered New York Bay, and now, when we can take a steamer down the harbor to Staten Island, and back again through Raritan Bay, Staten Island Sound, Kill von Kull, and Newark Bay.

A visitor at the foot of Charles and Tenth streets, New York, will be much interested in the large oyster boats moored at the docks of the North River at those points. He will find similar boats on the East River side, at the foot of Broome street and that vicinity. When he goes aboard and notes the busy scenes within and around, and the multitudes of yachts and sloops and smaller crafts coming and going about these docks and slips, he must be impressed with the fact that a great amount of business is transacted there. It is in fact the headquarters of a large trade in oysters and clams.

The Staten Island, Jersey, and Long Island oyster planters bring very much of their stock to be sold there. The names on the boats, such as Van Name, Hausmann, Elsworth, etc., direct you at once to Staten Island and its neighborhood. You are moved to go down the New York Bay again, to explore the place that is the occasion of so much business activity. In hunting up the oyster grounds and oyster cultivators, we come upon a number of interesting facts besides.

Verazzano anchored near the island in 1524, but before morning a severe gale compelled him to put to sea again. He never set foot on the land, then densely covered with forests, and occupied more or less by the Raritans, a branch of the great nation of Delawares or Leni-Lenapes Indians. It fell to Henry Hudson, sailing in the Half Moon, and arriving in the bay on September 3, 1609, to make the first landing for a white man. He called the island *Staaten Eylant*, the island of the states—that is, the States-General of Holland, under whose flag he was sailing. He found there tobacco, maize, and wild fruits. He took two of its Indians with him up the river to West Point.

The natives called the island "Aquehonga Manacknong." In some old accounts it is "Egquahous." One name makes it to signify "the place of bad woods."

In 1624 a number of Walloons, from near the river Scheldt, and from Flanders, came over with Peter Minuit, and settled the island. The Indians were always willing to sell, and they did sell the land several times over to successive parties, who came intending to stay, at different periods. The last of their deeds was given to Governor Lovelace in 1670. It was then designated as "the most commodiousest seate and richest land" in America.

Tradition says one of the first houses was built on the heights of New Brighton, and of bricks brought from Holland. In 1640 a "still" was erected, perhaps the first in America. A grist mill, a snuff mill, and a buckskin shop were soon started. At the present time many important industries are pursued on and about the island. Several large dyeing and printing establishments make colored fabrics of silk, cotton, and worsted. There are also fire brick and gas retort manufactories. The linoleum floor cloth, made from pulverized or ground cork and linseed oil, is manufactured here. This is an article more durable than oil cloth. There are white lead, linseed oil, and paper factories on the island. Also several large and extensive breweries. But the oyster farming is the most important of them all. It amounts to more than all the rest put together. This business has built up Mariner's Harbor, Tottenville, Port Richmond, and other places around the shores of the island. It has also had much to do in developing the extensive shipbuilding and commerce now carried on there.

Several things show that oysters and shell fish were abundant in these waters long before white men came. Shell heaps of several feet in thickness are found both on the shore and at points in the interior. They clearly mark the camping grounds of the aborigines, and show what furnished an important part of their food.

In the days when tribal wars were frequent, the Indians would naturally fix their camps amid the dense wood of the hills or vales a mile or two from the coast. The varying surface afforded numerous safe retreats. Squaws picked up the oysters with their hands, and carried them in baskets on their backs to the wigwams. Of course they could procure only such as were to be found in shoal water.

After the Dutch came rakes were used to some extent. But even to a quite recent date the oystermen have done much of their work by hand, wading into the water even in the coldest weather. The Dutch settlers have a number of family names now representing them connected with the various industries at present carried on. Some localities also possess Dutch names. The boats used in early times, and down to the memory of some now living, were the "periauzuas," or "piroguas." These were vessels without keels, having heavy lee boards, two masts, and two large sails.

The word "Kill," which occurs several times, as in "Great Kills," "Fresh Kills," "Kill von Kull," means "stream" or "water passage." Newark Bay was formerly called "the Kull." Kill von Kull means the stream or passage from the Kull. These places, with Prince's Bay, Raritan Bay, and New York Bay, are the spots where the Staten Island oyster cultivators have their farms or grounds. Nearly every one of these places has its local tradition to account for its designation or to mark it. Thus, the highest part of the ridge, which runs a considerable way through the island, is called "Toad Hill." Before the Revolutionary war, a young lady residing on that hill had two suitors at the same time. She had her preference, and took a peculiar course to turn off the unacceptable one. She procured and put into his capacious coat pocket two large toads. He did not discover the trick until the next Sabbath evening as he was dressing, with the expectation of making the girl another visit. The strong perfume led to an investigation that opened his eyes to the state of affairs. He took the hint and called no more. But the story got out. His young acquaintances tormented him by asking "when he intended to go to 'toad hill' again?" or "how the people on 'toad hill' were?" Thus this name, which originated in a jest, became fixed upon the locality.

In the various wars that have raged around New York and New Jersey, Staten Island and its people have had a prominent place. Its peculiar situation has exposed it to many vicissitudes during such conflicts.

Daniel Butler, Lott Rhett, Henry Money, Benjamin Joline, and Aaron Van Name, were among the first persons to see and take advantage of the waters about this island for oyster production. This was between sixty and seventy years ago. For some time they depended solely upon natural supplies. They went South and procured oysters and planted them for a few months in these waters. It was difficult then to find markets for many oysters. They sold a limited quantity in Washington Market, New York. They even took sloop loads to Albany. But it sometimes happened that they were compelled to bring them back unsold. People generally had not learned to eat oysters. At that time the present flourishing village of Tottenville was mostly a forest. Henry Money was its only inhabitant until young Aaron Van Name came to aid him in the oyster business. Afterward John Totten inaugurated and carried on shipbuilding, and gave his name to the place. Now there are quite a number of what are called "shipways," or, in New England phrase, "shipyards," in that part of the island.

To stand on the docks at Tottenville as the tide comes to its flood will afford one a view of the fleet of oyster boats as they return laden from the grounds. Most of the oyster gathering is done at low tide. Hence the men are coming to port as the tide rises. Sometimes they may remain away over two tides. It will be seen that as the tides rise and fall once in twelve hours, and the time changes one hour in every twenty-four, the men must go out to work at all hours of day and night during one month.

When there began to be a greater demand for oysters the natural beds failed to keep up the supply. Prices went up enormously. There were times when it was a great advantage to have a fast sailing vessel in which to carry oysters. The first arrivals netted large returns. The eager retailers would pay almost any price to secure the earliest supplies. From the first oysters have been sold by Staten Island dealers "by the count;" that is, so much a hundred or thousand. The enormous tide of travel through New York city makes a constant demand for this food whatever may be the price. Some will have oysters if they have to pay, like the American in Copenhagen, twenty-one cents a piece for them. Hotels and first-class saloons always expect to have them on hand however costly they may be.

(To be continued.)

© 1880 SCIENTIFIC AMERICAN, INC

NOVEL STEAM MOTOR.

The engraving shows one of the small steam motors recently brought into use. This is especially designed for the purpose of churning. The steam pressure is exerted against a flexible diaphragm, A, which presses against a convex abutment projecting from the lever, B. The engine is single acting, the lever, B, being forced upward by the steam, and returned by a weight on the end of the lever near its connection with the churn dasher rod.

The entrance and exit of steam to the chamber of the diaphragm, A, is controlled by a valve, C, worked by an arm, D, on the fulcrum of the lever, B, through the agency of a pivoted triangular frame, E, having pins which strike the arm on the valve spindle. As this device alone would only partly open or close the valve, the inventor has applied to the triangular frame a double acting spiral spring, which completes the movement of the triangular frame, E, and insures the complete opening and closing of the valve.

The upper pipe connected with the valve chest is the supply and the lower one the exhaust pipe. As steam is alternately admitted to and exhausted from the space beneath the diaphragm the lever, B, is oscillated, working the churn dasher. The internal construction of the motor will be seen in Fig. 2, which is a vertical section through the center of the steam chest and diaphragm.

This invention was recently patented by Mr. T. Mayhew, of this city.

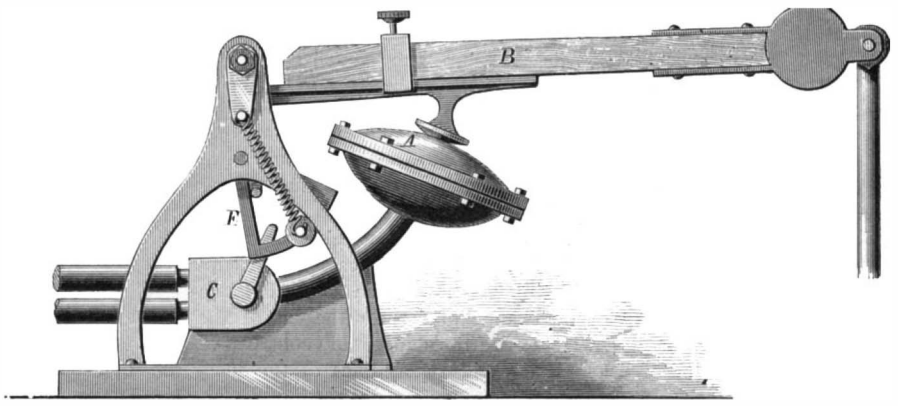


Fig. 1.—MAYHEW'S STEAM MOTOR.

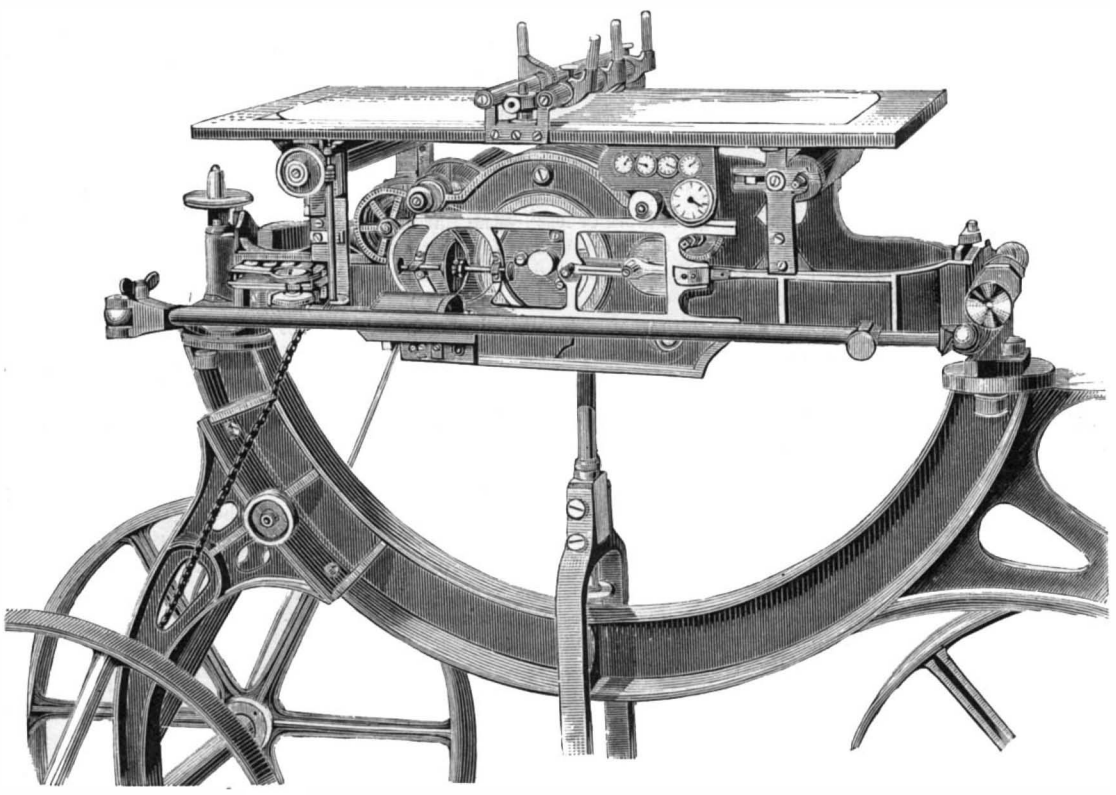
THE PROFILOGRAPH.

The instrument shown in the annexed engraving, which we take from *La Nature*, is the invention of Mr. Dumoulin, of Paris, and is used in obtaining the profile of a country. The instrument consists of a frame supported by four wheels, which may be adjusted rigidly in any desired position, but as a rule are arranged so that the movements of the machine do not deviate from a right line. The carriage supports a small table, upon which a sheet of paper is unrolled, parallel to the length of the table, for the purpose of receiving the drawing or tracing of the profile of the country traversed. The profile is drawn by a pencil or pin held perpendicularly above the table.

The entire mechanism of the instrument is operated by an endless chain, which is driven from the rear wheels or axle. An iron bar is suspended from the frame of the machine and is provided with a large metal ball at its lower end, forming a pendulum. If the carriage ascends or descends the pendulum will always maintain its vertical position, and it is only the machine that is inclined, and these alternate and variable inclinations produce either positive or negative displacements, accordingly as the machine ascends or descends.

These angular oscillations, which are transmitted by proper devices, determine the trigonometric law of the reciprocating movements of the paper and the pencil. The pencil mark is a resultant, for the sheet of paper moves positively, and this movement is constantly proportional to the cosines of the angles formed by the pendulum with the normal grade line of the country traversed, and the crayon rises and falls perpendicularly to the sheet of paper, the distances it rises and falls being proportional to the sines of the above angles, and the tracing obtained is nothing but a profile of the several angles. The apparatus does not only give an exact tracing of the profile of the country, in the scale of $\frac{1}{1500}$ for the horizontal dimensions and $\frac{1}{500}$ for the vertical dimensions, but it also records the distances traversed; that is, the figures of the horizontal dimensions or abscissas and of the vertical dimensions or ordinates.

The operation of the device is exceedingly simple, for one man draws the carriage along the line of the profile desired and the surveyor or superintendent accompanying the carriage stops it at every rod or post, notes the lengths shown on one of the indicators or counters, then draws a vertical line and notes the heights shown by the second indicators. He then proceeds and repeats this operation at each post. It is evident that an accurate profile can be obtained in a shorter time and with less expense than by the usual methods. It has been proposed to use this instrument in the government surveys in France.



THE PROFILOGRAPH.

MECHANICAL INVENTIONS.

Mr. William M. Thompson, Jr., of Barnhart's Mills, Pa., has patented an improved piston packing, which consists in wrapping the packing rope of a piston on a taper from the middle toward each end, so that it may be more readily inserted in the barrel and drawn out without catching on the tube joints.

Mr. Nelson Rogers, of Elgin, Ill., has patented certain improvements in jars of that class which are employed for holding fruits, vegetables, butter, milk, etc., and which are designed to be hermetically sealed. It is an improvement in that general form of jar in which a glass cover is made to rest inside the neck of the jar upon a shoulder, and the joint

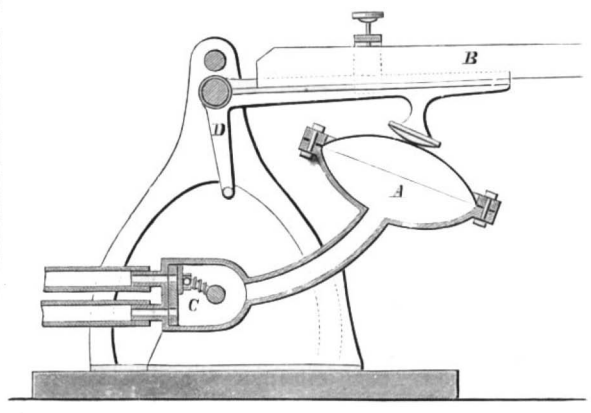


Fig. 2.—NOVEL STEAM MOTOR.

made tight by an elastic ring and a screw cap. The improvement consists, mainly, in forming the glass cover with a recess about its upper edge, placing therein a ring of cork or other elastic material, and then fastening an angular annular screw cap over the flush edges of the glass cover, the elastic ring, and the edge of the jar, so as to hold the parts to their place and make a tight joint.

Mr. James B. Cook, of London, Ontario, Canada, has invented a lock having a permutation wheel of novel construction, having pinholes carrying two or more pins, which release the bolt by their successive action when properly operated. The wheel also has a click for indicating the movement by sound, and a device that resets the lock or prevents movement of the bolt in case the wheel is improperly operated.

Mr. James Hall, of Glen Cove, N. Y., has patented an improved fastening for cans, which consists in a staple and plate of novel construction, especially adapted for application to milk cans as now made, as a permanent fixture, to be used with a padlock or other device to secure the cover.

Mr. David Bissell, of Detroit, Mich., has patented a bevel square in which the head can be set at any required angle quickly and with certainty, which contains in the stock or handle a pocket for the reception of a combined marker and screwdriver. It consists of a graduated arm pivoted at one end to the end of the handle opposite the head, by which, when thrown out of the pocket in the handle, the head is set to the required angle, and, lastly, of a pocket in the handle for the reception of the combined marker and set screw, provided with a rubber cushion for holding it in the pocket.

A useful pocket tool combining in one device the functions of several frequently used and desirable tools, has been patented by Mr. James H. Randell, of Acworth, Ga. It consists in a hollow metal handle formed with a shoulder to act as a square or gauge, and graduated in inches to form a rule, in combination with a blade sliding longitudinally into the chamber of the handle, having a series of saw teeth on one side, a cutting edge on the other, and a screwdriver point, the handle being made with a longitudinal slit, through which a lug or stem projects from the sliding blade and carries a tilting catch, by which the blade may be slid in or out and secured in either of the positions.

In the transfer of grain from railroad cars to elevators time is a most important element, and many labor and time saving methods and appliances have been adopted for the purpose of economizing in this direction. It is common now to lay a double track opposite the elevator and to sink a pit or pits between said tracks, into which pit or pits the elevating buckets are made to descend, so that the grain can be shoveled from the cars into these pits, and be thence elevated directly into the elevator building, the trains of cars being moved along at short intervals of time as one car is emptied, to bring the next succeeding one opposite the pit into which the car load is to be discharged. Mr. Stephen R. Kirby, of New York city, has patented a better and more effective device for this purpose. It consists of an endless chain or belt stretched over two chain pulleys or drums, and revolving between guides or in a long box that is fixed, preferably, in an upright or nearly upright position, the chain being provided at two opposite points in its length with lateral ears; a sliding plate or counterbalance moves in grooves in the guides, and is designed to be connected by a rope with one or more grain shovels or scoops, and the sliding plate is provided with lugs on its under face, with which the ears of the chain engage twice in each revolution, and thereby move the plate at each half revolution the length of the guide, and then release it so that the said plate may fall or be drawn back again.

An improved baling press, patented by Mr. Charles T. Christmas, of Riverton, Miss., is so constructed that the movement of the follower will diminish gradually in speed and extent, and the compressive power will increase in proportion; and as the levers come more into a perpendicular position the parts will be more capable of withstanding the strain, as the force will then be applied endwise of the levers.

Mr. Julien P. Wood, of Marlborough, Mass., has patented a novel construction of machines of that class in which the eyelet hole is punched and the eyelet set in one and the same operation; and it consists of a peculiar construction and arrangement of parts, in which the punch first descends upon a bed plate and cuts the hole, and then, without rising, passes laterally over a subjacent setting tool to feed the material. This material is then clamped by a presser foot, while the punch and bed separate and retreat laterally. An upper setting tool having the same lateral motion with the punch is then brought over the hole, after which the subjacent setting tool rises, catches an eyelet from a feed trough or chute, and then closes into the hole with the upper setting tool, to expand and set the eyelet.

A novel machine for blacking and polishing boots and shoes, while on the feet, has been patented by Mr. Pierre Paul Audoye, of Paris, France. It may also be used as well for harness, and, generally, for any articles that have to be polished.

© 1880 SCIENTIFIC AMERICAN, INC

Straw Thrashing in California.

The San Francisco *Alta* describes the process by which most of the wheat of California is thrashed by steam, usually the day it is cut.

The sickle is set on a level with the bottom of the lowest heads of grain, so as to take off no more of the straw than is necessary. From the platform behind the sickle the grain is carried by an endless apron or elevator into a wagon driven alongside the header; and this wagon, relieved by another at short intervals, transports the grain to the thrashing machine, which is not infrequently moved from one point of the field to another, so as to be near the header. Or, if the thrashing is to be done after the cutting, the header wagons throw their loads into piles, very different from the stacks carefully built of sheaves in those climes where rain is frequent in summer, and where the thrashing may be delayed until late in the fall. The management of the steam thrashing machine is usually the exclusive business during July, August, and September of its owner. If the machine is one of the ordinary size, he expects to thrash about 1,660 bushels—100,000 pounds—in a day; that is, if the crop is heavy and the circumstances favorable. He employs a dozen men, who are ordinarily boarded by the farmer, and he receives from 5 to 8 cents per bushel for thrashing. His total daily expenses may be $60, and his average gross receipts twice as much per day. He gets his pay on the basis of the weight of the grain as sacked, and the more soil, gravel, cheat, and other material that should be included, the greater his profit. If he thrashes the grain directly from the header wagon, there is little opportunity to get gravel in; but if the grain is fed to the thrashing machine from a pile on the ground, many shovelfuls containing as much soil as grain are fed into the machine. The foreign buyers complain to the shippers of the gravel, and the shippers to the farmers; but the remedy does not appear near at hand, for the evil is part of a complicated system. The thrasher may have $3,000 invested in his machine, wagons, horses, and tools needed for traveling and working; and as he hires and manages a dozen men, and has but a short season of thrashing, he must make a good profit. The business demands much skill in the control of machinery and men, and great care to prevent fires and accidents, so that the average profit is not unreasonably large. The charge for thrashing is low, because the farmers generally have preferred that the work should be done with haste rather than with care.

A NEW VELOCIPEDE.

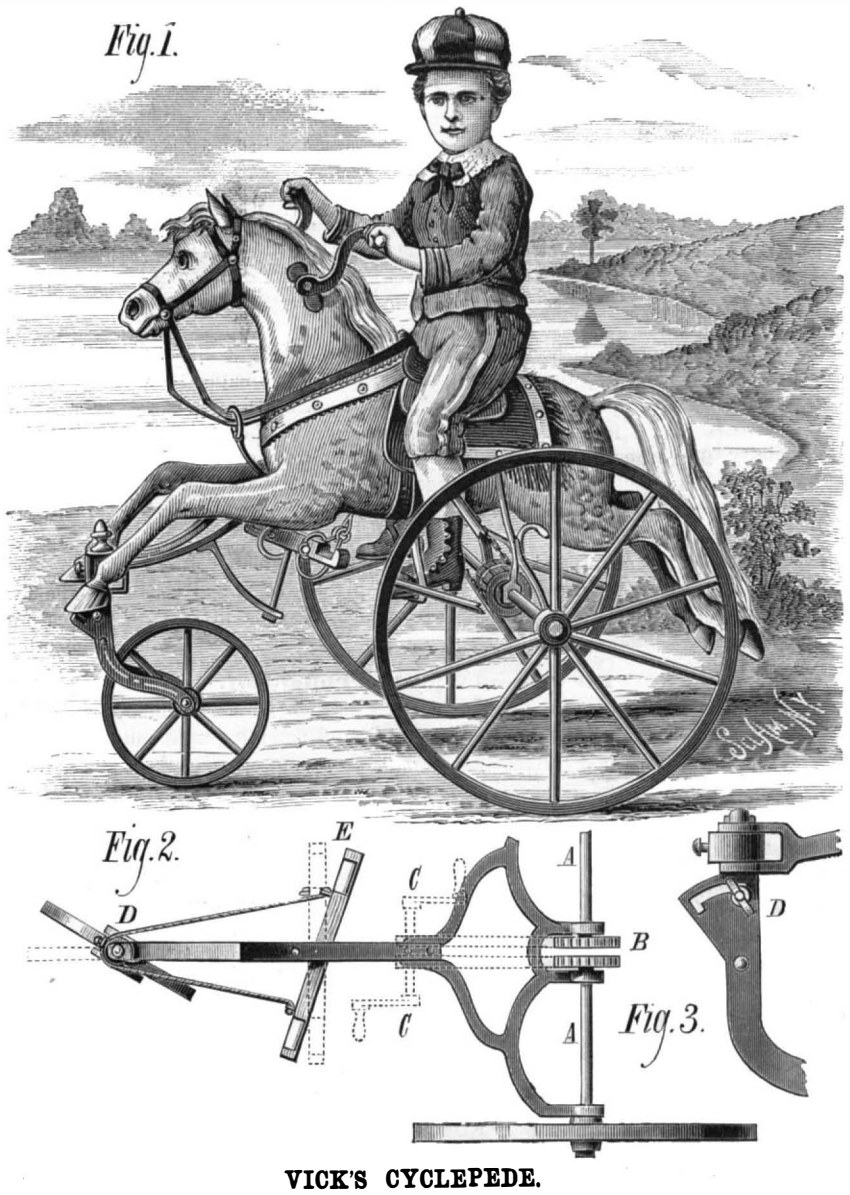
The engraving shows an improved velocipede more especially designed for the use of children. It is propelled by the hands, and may be steered by either the feet or hands. The body of the velocipede is preferably made in the form of a horse, but it may be made in a variety of other shapes, such as that of a carriage body, a chair, etc. The rear portion of the body is supported upon two wheels placed on axles, A, which are entirely independent of each other, and carry at their inner ends spur wheels, B, which are connected by endless chains with spur wheels on two independent shafts, C, journaled in the neck of the horse, and provided with hand cranks by which they may be turned.

The forward portion of the velocipede body is supported by a caster wheel, whose shank, D, is jointed and provided with an arc-shaped slot, having a notch at each end for receiving a transverse bolt passing through the pintle of the caster wheel. By means of this device the axle of the caster wheel may be placed as shown in Fig. 1, or it may be placed directly under the pintle, as shown in Fig. 3, when the wheel will be turned in the operation of steering by means of a foot lever or tiller pivoted under the body of the horse. This lever carries a strap which passes around a drum or pulley on the pintle of the caster. When the strap is not in use it may be hooked up out of the way. The arrangement of the working parts may be seen in Fig. 2, which is a partial plan view with the figure of the horse removed.

This invention will be appreciated by the youngsters, and will make a pleasing change after using the velocipede propelled by the feet, and with this machine the arms and chest will be developed.

It will be noticed that the rear or driving wheels are driven independently, and that one may be driven faster or slower than the other to steer the machine.

This invention was recently patented by Mr. Alfred Vick, of Mount Carmel, Conn., and will be manufactured and introduced by the "American Cyclepede Co." For further information address Theo. J. Harbach, 809 Filbert street, Philadelphia, Pa.



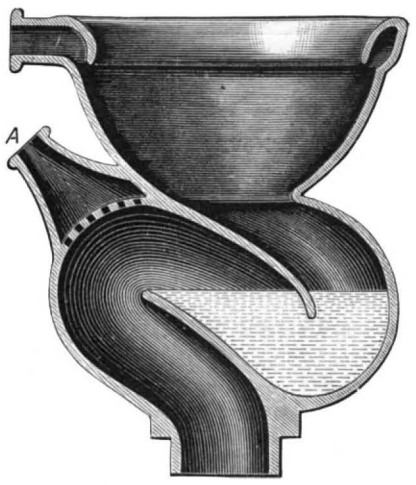
VICK'S CYCLEPEDE.

Banana Fiber.

Mr. Thomas J. Spear, of New Orleans, has been experimenting for many years with Southern plants with a view to their utilization in the manufacture of paper. The banana, he thinks, is the most valuable, as it grows with great rapidity, is nearly all fiber, never requires replanting after once a start has been made on a piece of ground, enriches the soil, and needs no cultivation. All that is required to do with it is to let it grow until frost, then cut and strip out the fiber. The plant grows to the height of ten or fifteen feet, and an acre planted in banana plants would yield eight or ten tons of fiber, out of which a paper equal, he thinks, to linen or hemp can be made.

IMPROVED CLOSETS.

The "complete" sanitary closet manufactured by Messrs. C. Winn & Co., Birmingham, is of a most simple and reliable character. It is made entirely of one piece of earthenware, and a reference to the accompanying sectional illustration clearly explains the arrangement. It is trapped above the floor line, is narrowest at the inlet, rendering stoppage scarcely possible. At the apex of this trap a deodorizing chamber is provided, to be filled with charcoal in connection with the ventilating outlet, A. The area of the closet for solid matter is very small, and there are no spaces where soil can in any way lodge or accumulate. The flushing apparatus, which, it will be understood, is an independent pump, having no connection with the closet except by the inlet pipe, is of the best known kind, and the force of water is concentrated where most required. After use, the whole of the water, soil, etc., passes from sight. We understand these closets are giving great satisfaction wherever fixed. This firm also make another on the same principle, called a slop closet, having a strong grating over the outlet, which prevents the loss of anything thrown in by accident.



IMPROVED CLOSETS.

Give the Boys Tools.

Almost all boys are naturally mechanics. The constructive and imitative faculties are developed, in part, at a very early age. All boys are not capable of being developed into good, practical, working mechanics, but most of them show their bent that way. There are few cases in which the boy has no competent idea of the production of a fabricated result from inorganic material, but such cases are rare. Given the proper encouragement and the means, and many boys whose mechanical aptness is allowed to run to waste, or is diverted from its natural course, would become good workmen, useful, producing members of the industrial community.

The mechanical boy ought to have a shop of his own. Let it be the attic, or an unused room, or a place in the barn or the woodshed. Give him a place and tools. Let him have a good pocket knife, gimlets, chisels, gouges, planes, cutting nippers, saws, a foot rule, and material to work. Let the boy have a chance. If he is a mechanic it will come out, and he will do himself credit. If he fails he is to follow some calling that does not demand mechanical skill.—*Boston Journal of Commerce.*

MISCELLANEOUS INVENTIONS.

An improved oil can top, which is so constructed that the oil that drips from the spout is returned into the can, has been patented by Mr. John R. Bennett, of Nunda, N. Y. The invention consists of a valve plug attached to a lever pivoted on the bottom plate of the spout, which closes a drip hole in an annular drip cup at the bottom of the spout when the lever is depressed.

An improvement in car brakes has been patented by Mr. Christian Ammarell, of East New York, N. Y. The object of the invention is to operate a car brake by a single spring and to lock the main lever of a car brake.

Mr. Stephen D. Field, of New York city, has patented a mechanical means for vibrating the tongue of a telegraph sounder or relay, and actuate the same by increase and decrease of current, or by making and breaking the circuit. The invention consists in a tongue fitted to vibrate between fixed points by the action of clockwork or other motive power, the clockwork being fitted with a brake that is operated by an electro-magnet in the line, so as to check and release the power, and thereby cause the vibration of the tongue.

An improvement in wire lathing has been patented by Mr. William Brennan, of New York city. The object of this invention is to support wire lathing in ceilings in such a manner as to leave no air spaces between the beams and the mortar; such spaces, in case of fire, serve as draught flues, and thus cause the fire to spread rapidly, and increase the difficulty of controlling the fire.

Mr. Felice Tocci, of New York city, has patented a book case that can be folded and its depth greatly lessened, thus enabling it to be packed in a much smaller space than when it is in use. It may be carried through narrow spaces where an ordinary case will not pass.

Mr. William Wilmington, of Toledo, O., has patented a car wheel chill formed with a solid body portion, and having an annular chamber located in its flange face, inclosed by an inner wall, formed in one piece with the metal inclosing the other sides of the chamber, and same shape as the adjacent contour of the flange of the wheel.

Mr. Jacob F. Weitzel, of Galveston, Tex., has patented an improvement upon that form of vegetable grater or slicer in which a tapering bucket or receptacle is made largest at the top, and is combined with a concentric and cone-shaped grater or slicer whose base rests close to the bottom edge of the bucket, and which cone-shaped grater or slicer is arranged to revolve and act upon the fruit or vegetables which wedge themselves by gravity down into the annular space. It consists in making the cone-shaped slicer or grater in oblate or elongated form in cross section, to improve the cutting action, and in combining the conical cutter and the reversely tapering bucket with a subjacent detachable pan carrying a spider frame with a socket to receive the end of the spindle of the cone-shaped cutter.

An improvement in car coupling has been patented by Mr. Charles H. Shippee, of Wickford, R. I. The object of the invention is to furnish automatic couplings of simple construction, having but few parts, strongly and durably fitted, and adapted for connection with the couplings now in use. The inventor makes use of a coupling and drawbar formed at its outer end with a swinging hook of peculiar construction, and fitted to slide endwise upon a block attached to the king bolt of the truck.

Mr. Carl J. Renz, of Hudson, N. Y., has invented an improved portable or pocket instrument or mould for use of travelers and others for making cigarettes neatly and expeditiously. It consists of a bed piece having a lengthwise groove and two compressing lids, which are hinged at the respective sides of said groove, and one of them provided with an extension consisting of a metal plate whose curve or conformation is similar to the groove in the bed piece, so that when the lids are closed the tobacco will be compressed in the paper envelope or wrapper.

An improved shoe-blacking machine, patented by Mr.

© 1880 SCIENTIFIC AMERICAN, INC

Pierre Audoye, of Bordeaux, France, has a series of circular bushes for cleaning, applying blacking, and polishing, and a treadle for imparting rotary motion to the same. The improvement relates particularly to the means for applying blacking to one of the brushes.

An improved horse collar has recently been patented by Mr. Fletcher C. Scott, of Fincastle, Va. This invention is an improvement in the class of horse collars in which the hames and collar proper are permanently attached to each other. The inventor forms the collar proper of a soft stuffed inner portion and an outer leather plate, which is comparatively stiff and forms the ornamental face of the collar, and also covers and protects said inner part. The collar is divided at top and bottom, and to each of the two parts thus formed is attached an iron hame, the same being inserted and secured between the outer covering plate and the inner or stuffed portion. Both the hames and the parts of the divided collar proper are connected at top and bottom by means of straps, so that they may be adjusted together to adapt the collar as a whole to necks of animals of different sizes.

A car coupling so constructed as to couple the cars automatically as they are run together, couple cars of different heights, and connect the cars securely, while giving them the necessary play for passing around the curves, has been patented by Messrs. Franklin A. Morand, of Cheyenne, and Joseph Edwards, of Hays city, Kan.

An improvement in fastenings for two handled fans, so constructed as to fasten the handles when the fans are opened and when they are closed, and which, while fastening the handles, will have a projecting loop to allow the fan to be hung, has been patented by Mr. Max Rubin, of New York city.

Messrs. Minard M. Smith and John Hassall, of New York, N. Y., have patented an improved fastener to be secured to the sides of the front opening of a glove for the purpose of keeping said opening closed, and the glove thereby close about the wrist of the wearer. The invention consists of two narrow flat strips of steel or other metal curved flatwise to conform with the hollow of the hand, and pivoted together at their enlarged circular ends, which are so fashioned that they lock together at the closed or fully open point.

Mr. Andrew McLean, of Jersey City, N. J., has patented an improved loom for weaving gauze fabrics. The invention consists in a novel combination of devices which cannot be fully described without engravings.

An improved bottle stopper, patented by Mr. James J. Allison, of Nelson, Ill., consists of a piece of spring wire that is bent double in the middle, forming an eye, and has its ends bent outward and down again to form two open side loops with free ends, whereby a double spring is obtained.

An improved snap hook, which does not require a spring to operate it and is simple and effective, has been patented by Mr. William Grassick, of Lucknow, Ontario, Canada. The invention consists of a curved U-shaped hook having an inner second hook at the bottom, and having a latch arm pivoted to the end for preventing the ring or staple from slipping out of the hook.

THE STEAMER ANTHRACITE.

Just at present steam and naval engineers in this vicinity are deeply interested in the application of high pressure steam to marine engines, an exhibition of the practicability of the system as developed by Mr. Perkins, of England, having been given by the Anthracite, the smallest steamer that ever crossed the ocean; and what seems anomalous is the fact that her boilers carry a larger pressure than any other steamer, while the engine power is developed by the smallest consumption of coal per horse power.

By invitation of Major George Deane, who represents Mr. Perkins in this country, we recently took a trip down the Bay and up the East River on this little steamer. She is not built for speed, but for economy. Her average speed is 7½ knots per hour. The engines are compound, having three cylinders, respectively 8, 16, and 23 inches in diameter, the stroke being 15 inches.

The small cylinder cuts off at ⅝ of the stroke when working normally, the intermediate cylinder at ¾, the larger one at ½.

The smaller and intermediate cylinders are arranged one above the other, and their pistons are attached to a common rod. The piston of the larger cylinder is connected with a separate crank.

The several pistons are provided with packing rings made of a metal invented by Mr. Perkins. The cylinders are never lubricated, yet the rings wear smoothly and are said to be very durable.

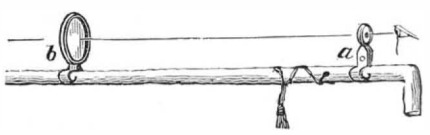
The engines are of 86 indicated H. P., and the boiler, which has only about 5 by 6 feet base, and a height of 8 feet, contains but 80 gallons of water, and consumes but 100 lb. of coal per hour. The screw is about 5 feet in diameter, and makes from 120 to 140 revolutions per minute.

The water, which must be pure, is used over and over again, and the waste, which is very slight, is supplied from fresh water carried on board. The steam pressure ranges from 350 to 500 lb. per square inch. The whistle is blown by a small supplementary boiler using salt water and receiving its heat from a coil connected with the main boiler.

We expect to give an engraving of the anthracite, together with some further particulars in our next issue.

NOVEL SPY-GLASS.

The spy-glass shown in the annexed cut is an invention of Mr. Theo. Geiger, of Stuttgart. Its construction is based upon the principles of Galileo's telescope, and it consists of a concave eye-lens and a convex object-glass, arranged so that the optical axis of both lenses are in a right line. In view of the increased focus of the object-glass, necessitating



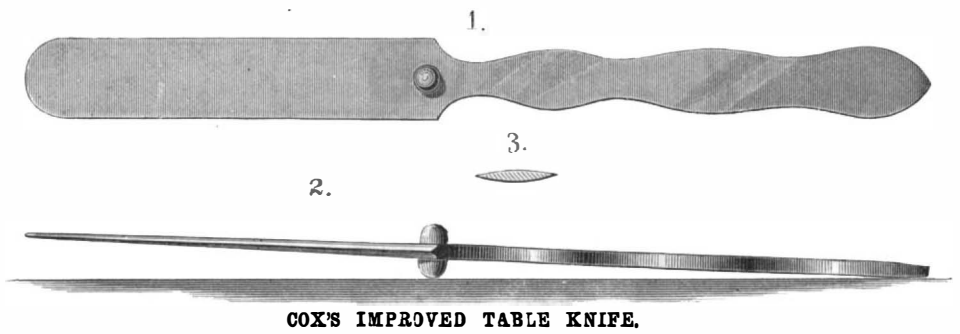
A NOVEL SPY-GLASS.

a greater space between the two lenses, the magnifying power is much greater than that of ordinary field-glasses. The eye lens, *a*, is attached to a cane near the handle of the cane by means of spring clamps, and the object glass is fastened to the cane in a like manner at *b*. The two lenses are 18 to 28 inches apart. The object-glass is focused by moving it backward or forward. The lenses may be used without a cane by simply holding them in the hands a suitable distance apart. In the latter form it is especially adapted for military purposes.

NEW TABLE KNIFE.

The table knife shown in the annexed engraving is a decided improvement over the knife now in general use. It is not only more shapely and more convenient to use, but in its manufacture little if any forging is done, it being made from thin metal, from which it is merely stamped into form. The grinding, polishing, and burnishing are easily and quickly done, as the knife has a smooth, flat surface from one end to the other, which makes it possible to do this part of the work by fixed machinery, thus saving a great deal of hand labor. The stud is put in after the knife is polished. It has two cutting edges instead of one, so that the user always finds his knife right side up; and, of course, two cutting edges will wear twice as long as one. It is lighter by one half than any of the other solid knives.

It is symmetrical and well balanced, and is more readily



COX'S IMPROVED TABLE KNIFE.

and agreeably handled than other forms of table knife. It is grasped by the hand and finger, and all of the pressure is exerted upon the handle, and never upon the blade.

Fig. 1 in the engraving is a side view of the knife; Fig. 2, a transverse section through the middle of the blade, showing the two cutting edges; and Fig. 3 is an edge view, showing the position the knife assumes when resting on the table.

This novel and useful invention was patented July 13, 1880. For further information, apply to the patentee, Mr. Arthur W. Cox, Auburn, Androscoggin Co., Maine.

The Concord School of Philosophy.

The second year's term of the Concord Summer School of Philosophy began July 12. Nearly fifty adult pupils and lecturers were present, among them many notable scholars, authors, and teachers. This is one of the most remarkable educational institutions of the day, a revival of the ancient Greek academy modified by the peculiar conditions, needs, and developments of the nineteenth century as displayed in the higher levels of American speculative thought.

In our issue of July 10, in describing a novel corn sled we gave the inventor's name incorrectly. It should have been William H. Woods, Elizabeth, Pa.

THE MAN WHO RAN THE FIRST LOCOMOTIVE IN AMERICA.

At the recent commencement exercises of Stevens Institute, Hoboken, N. J., one of the interesting features was the extempore remarks made by Horatio Allen, who was introduced to the audience by Prof. Morton as the Nestor of American engineers.

Among other things, he said that the first locomotive brought to this country was purchased by himself for the Delaware and Hudson Canal Company. This engine, the first to draw a railway train on this continent, was run for the first time on the road connecting the Lackawanna coal fields with tide water by way of the Delaware and Hudson Canal. It was the first road of any consequence to adopt locomotive power.

Mr. Allen gave a graphic description of the scene; how he mounted the engine alone, placed his hand boldly upon the lever of the throttle, and pulled the valve wide open, resolved, if he went down, to go manfully. He took an honest pride in being able to present to the audience the man who owned the hand that opened the valve of the first locomotive on the continent, and who took the first ride on the first railroad. This experimental trip was made at Honesdale, Pa., August 8, 1829.

BRICK TEA.

In a recent report on the trade of Kin Kiang, China, some interesting facts are given in regard to the manufacture of and traffic in a product known as "brick tea." The quantity of this kind of tea exported from Kin Kiang during one year has amounted to 681,333 pounds. There are three kinds of brick tea made. The first, or largest kind, is a cake of coarse green tea, which weighs, when thoroughly dried, about three and a half pounds, and is about one foot long by seven inches wide. These cakes are made in a wooden mould while wet, and compressed by a lever press and afterward dried. This is all done by hand labor, and affords employment to a large number of coolies. When dried, each cake is wrapped in paper and packed in strong baskets, each containing thirty-six cakes. The cost of this tea per basket is about $6.75, and the annual exportation amounts to from 15,000 to 20,000 baskets. The tea is sent from Kin Kiang to Tientsin, from whence it goes overland through Mongolia for consumption among the inhabitants of West and Northwest Siberia, in the province of Kazan, on the Volga, and by the Kirghis and other Seutas tribes. A cake of tea of the same form, but of a much commoner quality, costing about $5.25, made by the Chinese at Yang-lon-tung, in Hupeh, is largely consumed in Mongolia. There being no copper currency in that country the Chinese bankers in Mongolia keep stores of this brick tea and issue it as a monetary medium.

The second kind of brick tea is of a finer quality, each cake weighing 1½ pound, and being 8¼ inches long by 5¼ inches wide. It is packed in baskets, each containing 80 or 90, and costs about $8.25 per basket. This kind is consumed in West and Southwest Siberia, at Kazan, and on the Amoor.

The third kind of brick tea is made of black tea dust, each cake weighing 2¼ pounds, and being 8½ inches long by 6 inches wide. It is packed in baskets containing 64 cakes each, and costs about $8 per basket. It is consumed throughout Siberia and in Eastern European Russia by the peasantry. It is made into cakes at Foochow, Kin Kang, and Hangkow. The yearly exportation from the three places is about 100,000 baskets. It is stated that at Hangkow there are now four brick tea factories, two of which employ steam power. The employment of steam instead of hand presses will ultimately cheapen the cost of production, and at the same time a more satisfactory article will be placed on the market. Brick tea made in the old manner was not pressed sufficiently hard to enable it to successfully resist the rough treatment it received *en route*, and frequently reached its destination in a broken and crumbling condition, which detracted from its value, buyers laying considerable stress on its hardness and perfection.

American Philological Association.

The Twelfth Annual Convention of the American Philological Association was held in Philadelphia, July 13–15. The attendance was fair, and a number of valuable papers were read. Professor L. R. Packard, of Yale, was elected President for the ensuing year. The other officers chosen were: Vice-presidents: Prof. Fred. D. Allen, of Harvard, and Prof. M. W. Humphries, of Vanderbilt University, Nashville, Tenn. Secretary and Curator: Prof. Chas. B. Lanman, of Harvard. Treasurer: Chas. J. Buckingham, Poughkeepsie, N. Y. Executive Committee: Dr. W. C. Cattell, President of Lafayette College, Easton, Pa.; Basil C. Gildersleeve, Professor of Greek, Johns Hopkins University, Baltimore; William W. Goodman, Professor of Greek, Yale College; Dr. J. Hammond, of Hartford, Conn., and Wm. D. Whitney, Professor of Comparative Philology, Yale College. Next year's meeting will be at Cleveland, O.

California Vineyards.

The average of vines in California is officially rated at about 60,000 acres, and it is thought that from six to eight thousand acres more will be planted to vines this year. If the entire grape crop were made into wine the yield in ordinary years would exceed 25,000,000 gallons. The actual wine product during the past five years has ranged between 4,000,000 and 6,000,000 gallons, the smallest yield falling in 1878. The possible yield in wine is lessened by the large distillation into brandies (about 250,000 gallons a year) the production of sweet wines, the consumption of grapes for table use and export to the Eastern States, and finally by the manufacture of raisins. The wine yield this coming year is expected to be very large, perhaps 10,000,000 gallons.

© 1880 SCIENTIFIC AMERICAN, INC

AMERICAN INDUSTRIES.—No. 51.

THE MANUFACTURE OF PULSOMETER PUMPS.

In 1872 an important addition was made to the previously existing varieties of pumps in the market, in the introduction of an entirely new style, made under patents then obtained by C. Henry Hall, in which the direct pressure of steam was used to force the liquid raised by a vacuum produced by the condensation of the steam. This idea at once struck engineers and mechanics as an important innovation, and, as the pump was constructed without pistons or connecting rods, and had neither cams, eccentrics, nor stuffing boxes, it had no exhaust and required no lubrication. In consequence of these desirable features it immediately became popular. There were, however, some defects in the mechanical construction of some of the earlier pumps made under these patents, on account of which many failed to work satisfactorily, while others were eminently successful, and have been in use to this day, showing that the principle on which they were designed to operate was all that the inventor claimed for it.

The illustrations we present on the first page of this paper show some of the processes of manufacture, and give different views of the "new" pulsometer pump, so styled because, while embodying no new elementary principles, the pump has been so improved as to obviate the difficulties of detail and imperfect workmanship which characterized many of the earlier pumps made under the Hall patents. These pumps are now believed to combine great strength, durability, and efficiency with a simplicity of construction that makes it almost impossible for them to get out of order, and an economy in working that places them in the front rank in a field where the competition is very searching and severe. The name "pulsometer" is a registered trade mark of the company, and is very suggestive of the operation of the pump.

An explanation of the working of the pump will be best understood by a reference to the illustrations. In Fig. 1, A A are two bottle shaped chambers formed in one casting, side by side. Their tapering necks are bent toward each other and terminate in a single upright passage, in which there is a ball valve, C, which is fitted to a seat in each neck, and capable of oscillating so as to close either neck. The upper portion of the pulsometer containing the ball valve is made separately, so that it may be renewed when worn out without having to replace the entire pump. The chambers, A, have openings connecting with the vertical induction passage, D, provided with valves, E E, of vulcanized rubber, which, together with their seats, F F, may be easily removed and replaced by new ones should they become worn. The delivery passage, H, is common to both chambers, and its valve seats, G G, have the same style of valves as the induction passage. The discharge chamber and its valves is shown in Fig. 2. J is the vacuum chamber, cast with and between the necks of chambers, A A, and connecting with the induction passage only below the valves, E E. K K are covers closing openings to the respective chambers to admit of getting at the valves and valve seats when necessary. A small air check valve, shown in the front view, Fig. 3, is screwed into the neck of each of the chambers, A A, and one in the vacuum chamber, J, the first to admit a small quantity of air above the water to prevent the steam from coming into actual contact with the water, thus forming an air piston, which prevents condensation. The valve in the vacuum chamber, J, serves to cushion the water column and to prevent the hammering which would otherwise occur upon filling the chambers alternately.

This pump when in operation is connected at the top with a steam supply pipe and at the bottom with the suction pipe, and the discharge pipe is connected with the discharge chamber. All the air check valves being closed, the steam is admitted, displacing the air from one of the chambers. The steam supply is then cut off, and the steam contained by the chamber condenses, forming a vacuum, when the chamber will immediately fill with water through the induction pipe. In starting the pump the hand is kept on the steam valve, turning the steam on and off four or five times until the regular operation is established. The vacuum formed in the chamber to which the steam is first admitted causes the ball valve, C, to close the opening in the neck of the chamber, and at the same time to admit steam into the opposite chamber, where, after shutting off the steam, a vacuum is made and the chamber fills with water. In this way, after the steam has been thus admitted four or five times, the alternate action of the chambers is established, and each of the air check valves is opened enough to cause a regular and continuous action, which will be recognized by the steady pulsation and smooth working of the ball valve, C, as the steam enters first one chamber and then another. The steam, entering the chamber directly above the water, presses upon and forces it out through the discharge valve with a force proportionate to the pressure of steam applied. When the water has been displaced by the steam, which follows it to the opening of the discharge chamber, the steam suddenly condenses.

It will be seen that in this way the steam pressure acting directly on the water, and the vacuum resulting from the condensation of the steam, act in alternation in drawing and forcing the water.

The economy of these pumps, working, as they do, without mechanical devices to absorb power, and with no appreciable friction, has been abundantly attested. It is estimated that 750 gallons per minute can be raised by a No. 8 pulsometer pump, supplied with steam through a one inch pipe; the pressure of steam necessary, depending on the height to which the water is raised. Good results on a lift of 40 feet have been obtained with steam at 30 lb. pressure, and on lifts of 70 feet with a steam pressure of 40 lb., although much must necessarily depend upon the situation of the pump, length of suction and delivery pipes, etc., while in other fluids than water these figures would of course be different.

The No. 8 pulsometer has suction and discharge pipes 5 inches in diameter, and occupies a floor space of only 20 x 31½ inches, its height being 54 inches, and weight 1,300 pounds. The company claim that the expenditure of power to operate their pumps is less than one-half of that ordinarily required to do the same work by other means, and have a large number of testimonials from both home and foreign users to support this statement. For use in mines the pulsometer has the special advantage of condensing all of the steam used. The temperature of the fluid being raised is increased one or two degrees, but there is no escape of steam. For tanneries, breweries, paper manufacturers, and as a ship's pump, or for filling water tanks of railways, it has some special advantages, as the arrangement of its valves is such that it is difficult for it to become clogged, and should this happen the parts can be readily removed and the trouble remedied. In a new sewage steamer lately built for the city of Liverpool, England, a large-sized pulsometer has given especial satisfaction.

It may be made of brass or other metal for pumping liquids destructive to iron, lead being used for acids, bronze for sugar works, and special compositions for other purposes; and one user of the pulsometer has it fitted with lignumvitæ ball valves, instead of the usual vulcanized rubber valves, to adapt it to pumping liquids which have a large proportion of grease. The company also fit up the pulsometer with rubber ball valves, instead of the ordinary flat ones, for extra dirty sewer work, and for paper mills, tanneries, etc.

It is believed that the improvements which are embodied in the "new" pulsometer are such as will obviate all objections heretofore urged by those who have had imperfect pumps, and justify the claims long since made for this pump as being among the first for cheapness, simplicity, and strength, as well as for efficiency and economy in its operation. It is manufactured and sold only by the Pulsometer Steam Pump Company, 83 John street, New York, Wm. F. Kidder being president of the company, G. F. Badger, secretary, and Geo. W. Laird, treasurer.

AGRICULTURAL INVENTIONS.

Mr. Alfred C. Dodge, of Charlotte, Mich., has patented a simple and convenient device which may be attached to the leg of the milker for holding a milk pail. It will hold the pail in a well protected position, preventing its being upset by the cow, and preventing dirt from being thrown into it. It will admit of both hands being used by the milker.

An improved corn sheller, patented by Mr. Berthold A. Kamp, of Evansville, Ind., is so constructed that it will not become clogged, will not break the cobs, will carry the cobs out of the way, and will deliver the shelled corn into a spout, whence it can be drawn off into sacks or other receivers.

Mr. John J. Knapp, of Lewisburg, W. V., has invented an improved mower which is simple in construction and effective in operation, easily adjusted and controlled, and which will work with less wear and tear than mowers constructed in the usual way.

Prizes for Potters' Machinery.

Not long ago the attention of the readers of this paper was directed to the fact that in no other manufacturing industry had there been so little advance made as in the fabrication of pottery.

We are pleased to learn from the *Pottery and Glassware Reporter* that at the last annual convention of the United States Potters' Association this subject was considered and discussed at some length, and the following resolution was adopted:

"*Resolved*, That a reward of five hundred dollars be and is hereby offered to any person who may invent and offer to us any new and useful machinery of importance to us, applicable to our art and business.

"And that a reward of two hundred and fifty dollars be and is hereby offered by us to any person who may invent any essential and useful improvement to or upon any machinery now in use by us. Provided, that these inventions or improvements are free from all patents obtained or to be obtained from the inventor or any other person.

"And that a committee of three be appointed to investigate and test these inventions and improvements, and when, in their opinion, these rewards or either of them be fairly and fully earned, or if in their opinion a portion only of the above rewards be earned by the parties presenting them, the committee shall have power to draw upon the treasurer through the Executive Committee for such sum or sums as the committee may have agreed to, not exceeding the above named amounts."

These prizes are certainly worth competing for, and should enlist the earnest efforts of many inventors in the competition. All communications relating to machinery and rewards should be made to the members of the committee called for in the closing clause of the above resolution, Messrs. Thomas C. Smith, Greenpoint, N. Y.; John Moses, Trenton, N. J.; M. Tempest, Cincinnati, O.

In alluding to the premiums offered, the editor of the above journal adds: "Whatever causes may be to blame for it, it is an established fact that potting is behind the age in the matter of labor-saving machinery, the same hand processes being now employed as were in vogue thousands of years ago. While every other industry has benefited largely by the inventive genius of modern times, the potter plods on in much the same way as did his forefathers in the art. This state of affairs is largely due, probably, to the conservatism of the potters themselves, who seem very generally to go on the principle that 'what was good enough for their fathers is good enough for them,' and partly to the fact that the attention of inventors has never been publicly called to the needs of the industry in this regard. Once let it become known among inventors that the machinery of improved form is needed, and from all the devices likely to be offered something can certainly be selected to suit the different purposes."

Raisin Wine.

The conservative minds of old-fashioned French wine merchants are just now greatly agitated with regard to the subject of making wines from dried grapes. These merchants affirm that the great entrepots at Paris were constructed for the purpose of holding wine, and not a liquid made by pouring water upon Turkish raisins and then fermenting the remarkable product. This "new departure" is not, they assert, wine at all, and its existence is a fraud upon the legitimate trade. They have consequently been petitioning the Municipal Council of Paris to repress this new and not particularly creditable industry. But the Council, after listening with much patience to the *pros* and *cons* of the case as put before them, have decided that the new kind of wine is lawful, because in the first place it is made from grapes, and is produced by processes similar to those used in the making of ordinary wine, namely, pressing, fermentation, racking, etc. The new description of wine contains alcohol, and yields its fair proportion to the direct taxation of the country and to the *octroi* of the different towns whither it may be conveyed. It is further asserted that this wine from dried raisins is not injurious to health, and that when blended in certain proportions with ordinary wine its presence cannot be detected. It is, moreover, comparatively cheap; and thus it affords for the lower classes a useful drink; therefore the Municipal Council of Paris considers that its production should be encouraged rather than repressed at a time when the natural wine products of France are so much below the average. With regard to English consumers, they will doubtless never have an opportunity of tasting the dried grape wine unless they find themselves in some low class cabaret in Paris, or some other large town in France. It is not probable that, in the ordinary way of trade, wines of this character will be sent over here. The blending of wines from various departments surrounding the Gironde has, we are well aware, been carried on for some time, and perhaps never was the demand for these adjuncts to claret greater than at present. The wines of Narbonne, of Roussillon, etc., have been largely purchased at Bordeaux for this purpose; in fact, claret at £5 per hogshead cannot now be produced without this aid. But raisin wine is not likely to be used just at present in the Gironde. If ever it should be employed by shippers there, owing to the destruction of French vineyards, then we can import raisins from the Levant almost as cheaply as our Gallic neighbors, and make the cheerful and exhilarating beverage at home. —*London Grocer.*

The Epidemic at Adams, Mass.

The epidemic at Adams, Mass., has finally been traced to the water supply. Engineer Locke has made a map of the town, indicating by red dots every house where there was a case of sickness, and by small circles every house which escaped, covering both the village proper and all the roads leading out of it. Afterward he drew the line of the water pipe on his map, and everywhere the red dots stop with the pipe and follow its course. He cites numerous instances to prove that the water was the sole cause of the trouble, and shows that nearly everybody who was pointed out as not using the town water, although sick, had been in the district and drank the water. He locates the impurity in an old mill-dam through which the water passes, and says he found it full of decaying vegetable matter which gave forth an offensive odor perceived at some distance from the pond. That, he thinks, was sufficient to cause the outbreak, in connection with the peculiar weather which had prepared the people for the epidemic.

Value of Swamp Muck.

Some time ago we remarked that an acre of swamp muck of good quality, three feet deep, was actually worth $25,000. No doubt such a statement is surprising. So was the statement of Dr. Lawes, of England, that a ton of bran fed to cows returned more than its cost in manure. Swamp muck, free from sand, contains two per cent or forty pounds of nitrogen in a ton. Nitrogen is worth in the market twenty-five cents per pound, so that a ton of swamp muck is actually worth $10 for the nitrogen in it. All that is needed is to work up the muck, so as to make the nitrogen available. An acre of swamp muck three feet deep contains 2,500 tons, and would require eight months to draw out, at ten loads a day. Few persons realize the value of the fertilizing elements of common waste matters which lie under their feet, and the innumerable tons of matter that may be available for fertilizing purposes, and that much of the idle and neglected materials represent a vast amount of wealth.—*American Agriculturist.*

© 1880 SCIENTIFIC AMERICAN, INC

IMPROVED METHOD OF SECURING CAR WHEELS TO THE AXLES.

The accompanying illustration shows the patented method adopted by Messrs. William Jessop & Sons (Limited), of the Brightside Steel Works, Sheffield, of securing car wheels to their axles. The advantages claimed for this method are simplicity of construction, few loose parts, and the ease and rapidity with which the wheels can be taken off and replaced securely on the axles, a great desideratum in the case of a broken wheel. The gripping action of wheels made according to this invention may be compared to the grasp of a hand, the boss of the wheel contracting round the whole surface of the periphery of the axle, and not bearing on two or three points only, as is generally the case where the wheel is secured by keying or by a nut.

Fig. 1 is a sectional view of a wheel fitted to an axle having inside bearings. A is the axle, the end being shown in section at B, showing the recess, D, and key plate, C, the lower end of which fits into the recess, D. The key-plate is held between the arm and lug, H (Fig. 2), in the space, E, and is secured by the bolt and nut, F. G is the center hole of the wheel. It will be seen that the boss of the wheel is not cast solid, but that the space or key-way, E, cuts through into the center hole; when, therefore, the nut of the bolt, F, is screwed up tightly, it draws the lug, H, toward the arm, and contracts the diameter of the center hole, gripping the axle with immense power. All that is necessary to release a wheel is to unscrew the nut, when the boss of the wheel expands, and the wheel may be removed. To make any movement of the wheel or the axle (either lengthwise or rotary) impossible, a slot or recess, as before mentioned, is made in the axle, a key plate is made to fit into this, and is held between the lug and the arm of the wheel, the bolt used to contract the boss being also used to secure the key plate by passing through a suitable hole at its upper end.

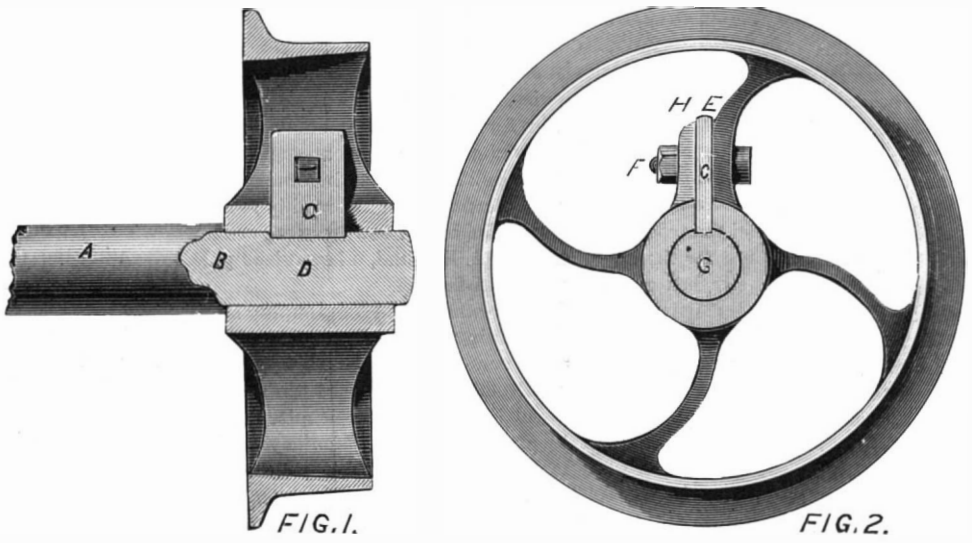


FIG. 1. FIG. 2.

NEW METHOD OF SECURING CAR WHEELS.

Our Sugar Refineries.

The discussion among the leading sugar refiners, looking to the placing of the refining business in the hands of an executive committee to put a stop to over-production, brings out the fact that there are in the United States nineteen refineries in active operation, with a capacity of about 7,500,000 pounds daily, while the daily consumption does not exceed three-fourths of this quantity.

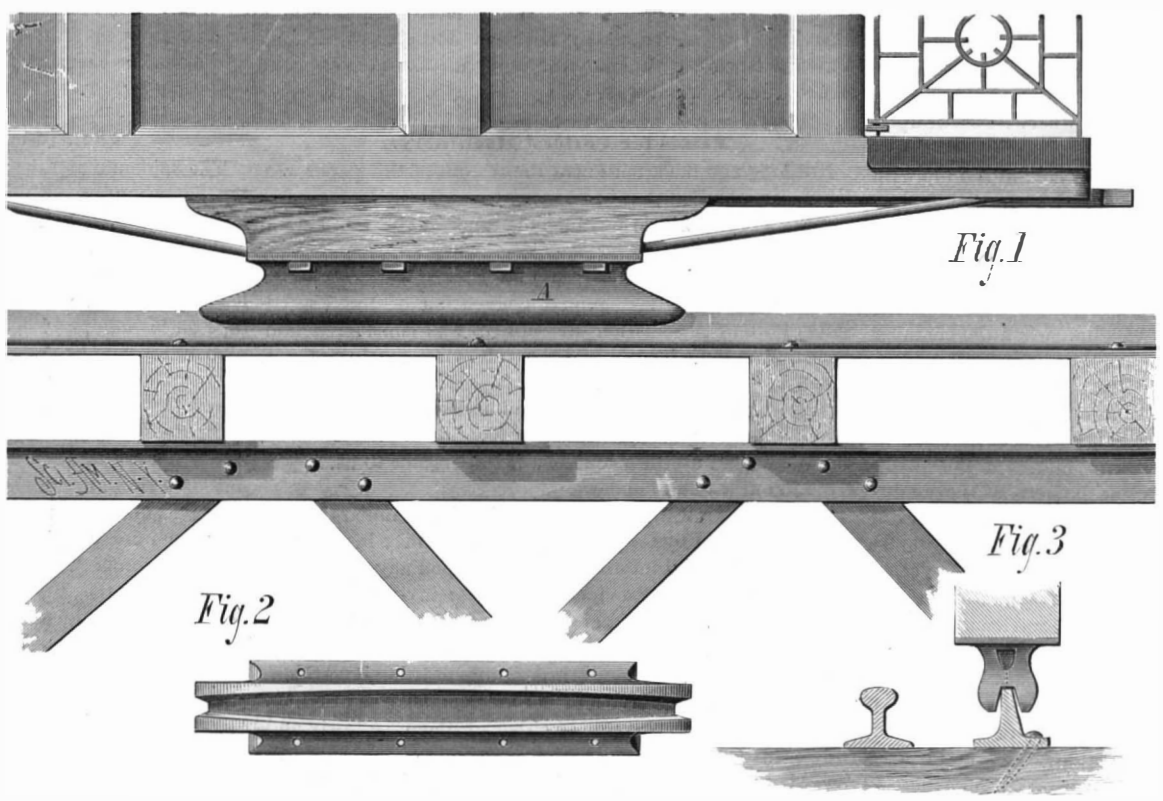
NOVEL METHOD OF RUNNING RAILROAD CARS.

The engraving represents a novel plan for moving the cars of elevated railroads without jar or noise and without subjecting the track or trestle work to the concussions incident to the use of wheels. The tendency of continued pounding and jarring is to enlarge the holes in the beams and braces, to shear off the rivets, and to weaken the structure. The inventor of the device illustrated proposes to do away with all of this wear and tear, and to make the elevated roads practically noiseless. Certainly such a state of things is greatly desired by the property owners, business houses, and residents along the lines of the elevated roads, and no doubt the roads themselves would be greatly benefited by the adoption of any device that would accomplish these results.

The device is exceedingly simple, and apparently not difficult to apply to the existing structures or the cars now in use.

The invention consists in substituting for the present wheels and axles a set of sliders or skates, which run upon special rails placed upon the ties, outside of the ordinary rails, the latter being used for the drive wheels of the locomotive. The inventor says that the drive wheels, being large and running at a comparatively slow speed, make no appreciable noise, and it is claimed that with proper lubrication a train may be moved with the skates on the plain track with less power than is now required to move cars provided with wheels. The skates are each provided with a chamber for containing a lubricant, and are fitted to receive wearing slips in the groove on the under side, so that when the skate becomes worn, the worn surface may be removed and replaced without interfering with the main portion. The auxiliary track is made of steel, and is quite narrow at the top, and is smoothly finished and polished, so that when slightly lubricated the car will glide smoothly and easily. The lubricant is slowly applied to the special track through small holes extending from the chamber to the lower face of the skate.

A portion of a car with the skate attached is shown in Fig. 1; and Fig. 2 is a bottom view of the skate, showing the removable wearing surface, and the curved form of the sides of the groove which adapt it to curves. Fig. 3 is a transverse section of one side of the track, showing the relative position of the two rails and the skate.



COX'S IMPROVEMENT IN RUNNING RAILROAD CARS.

The inventor claims that the saving which this device would effect in journals and wheels would pay the expense of the change, and that it would last much longer without repairs. As a matter of engineering, the problem of applying this invention to the existing roads is very simple. Switches, crossings, etc., are easily arranged, and no material changes will be required in the working of the roads.

This invention has been lately patented by Mr. James R. Cox, of Auburn, N. Y., who may be addressed for further information.

NEW INVENTIONS.

An improvement in cotton choppers, patented by Mr. John Warren, of Newton Factory, Ga., consists in combining with curved arms blades having upwardly turned cutting ends, a horizontal blade, and a slotted bar.

Mr. James M. Harrison, of Hollansburg, O., has invented a hand corn planter, which is an improvement on the hand corn planters for which letters patent No. 111,202 were granted to the same inventor January 24, 1871.

Mr. De Laski T. Clemons, of Hornellsville, N. Y., has patented a table-leaf support, so constructed that it will adjust itself in position when the leaf is raised, and by being slightly moved will allow the leaf to drop, the support being pushed out of the way by the weight of the leaf.

In an improved crucible furnace, patented by Mr. Georg Fischer, of Hainfeld, Austria, the lower part of the furnace containing the crucibles and fuel is fitted to be raised by means of an elevator and put in connection with the middle portion of the furnace, or let down upon a track on the floor of the smelting house for removal and replaced by another lower portion previously heated and charged with crucibles. The object of the invention is to produce a continuously working furnace by allowing the lower part of the furnace to be raised and put in connection with the middle part or separated therefrom and lowered on a track leading to the foundry. In this way separate charges of crucibles are being heated, raised into the furnace, and being taken to the foundry, rendering the operation continuous.

Mr. Nixon Thomas, of Dupont, Ind., has patented an improved device for increasing the efficiency of those washing machines that operate by pounding the clothes. The invention consists in a combination of parts that cannot be clearly described without engravings.

An improved force pump has been patented by Mr. Philip A. Myers, of Ashland, O. The invention consists in a novel construction and arrangement of the various parts of a pump. Although it is quite simple it cannot be clearly described without engravings.

Mr. Marion H. Simmons, of Atchison, Kan., has patented an improved self-locking clevis, which has two arms hinged to each other at their forward ends by a pin, the one arm having a pin at its rear end and the other having a notch to receive the pin, the corresponding hooks formed upon the forward ends of the arms, and the link hinged to the end of one of the hooks, whereby the clevis can be readily attached to a double tree or other object.

An improvement in the class of devices which combine the functions of a measure and funnel for use in drawing off and measuring small quantities of liquids and such dry solid substances as will flow readily, has been patented by Messrs. Allen C. Smith and Henry W. King, of Canaan, N. Y. The invention is embodied in two parts, which are connected so as to form practically one measuring funnel. The parts are a cylinder having a tapering nozzle and mouth or receiving opening to adapt it to serve as a funnel, and a measuring cylinder or vessel, which also has an open mouth, and is placed in the former or funnel cylinder and pivoted in such manner that it may be tilted for the purpose of discharging its contents into the same.

A ditching machine that, as it moves along, cuts and removes the earth and deposits it on the sides of the ditch by means of an inclined auger, has been patented by Mr. Andrew D. Martin, of Abbeville, La.

An improved fence post, patented by Mr. Andrew Climie, of Ann Arbor, Mich., combines the advantages of wood and stone and to produce a post or tie that is substantial and practically indestructible. It consists, essentially, in a post or sill made of concrete, and provided with an iron rod for strengthening it longitudinally, and with transverse branches of the rod for attaching the fence rails to the post or the planks or boards to the sill.

Messrs. James T. Coughlin and August P. Schneider, of New York city, have patented an improvement in the construction of boats. The invention relates to the manufacture of boats, especially light shell or race boats. It consists in the use of sheet cork as a material for the shell of boats, strengthened by sheets of thin cloth or other suitable material, which is secured upon the inner and outer sides of the shell by waterproof varnish.

Mr. Francis M. Myers, of Jersey City Heights, N. J., has patented an improved article of board for bookbinders' and box makers' use, and a new process of making it. Heretofore such board has been made of a single homogeneous sheet of paper of the required thickness and then dried on the cylinder. This mode of making the board is, however, objectionable, on account of the difficulty experienced in drying sheets above a certain thickness without injuring the qualities of the board. The improvement consists in making the board of two or more homogeneous sheets of board cemented together.

An improved washing machine, patented by Mr. Fred. Ernest Arnold, of Chicago, is so constructed as to do the work quickly and thoroughly. It is simple in construction and easily operated.

An improved apparatus for opening hinged gates, patented by Mr. Henry Allen, of Silverton, Oregon, consists in the combination and arrangement of devices for elevating the pivoted latch of a laterally swinging gate.

© 1880 SCIENTIFIC AMERICAN, INC

THE LEATHER CARP.

BY A. W. ROBERTS.

The leather carp (*Cyprinus nudus*, Block) is distinguished from the mirror carp by having only a few scales along the back and abdomen, and sometimes none. The intermediate space consists of a thick skin, soft, and velvety to the touch like that of a frog. The general color is a dark olive brown. Its mouth is toothless, but situated on the pharyngeal bones of the throat are three rows of stout teeth. The lips are thick, and on the upper jaw are four barbels, two short and two long.

Carp were first cultivated in Austria in 1227, in the time of Charles IV. At the present time the Princes of Schwarzenberg own ponds comprising a total area of twenty thousand acres. The annual catch of carp from these ponds is five hundred thousand pounds. The leather carp, from the fact of its being scaleless (or nearly so), is a much safer fish to transport and keep than the mirror or scale carp. In transporting fish great danger is always encountered from chafing, bruising, and scaling. As a rule, when a fish loses a scale or is chafed or bruised it seldom escapes being attacked with fungus; on the other hand, the leather carp, having a tough, pliable, and slippery skin, like that of a frog, it will heal more readily, the epithelium covering it immediately the new skin will begin to form. Mr. Rudolph Hessel says he has often seen scars on the leather carp produced from the bite of a heron or pike or some other hurt, but never saw anything of the kind on a scale carp, for if one of these be wounded it almost invariably dies. The scale, mirror, and leather carp will live in either fresh or salt water. They have been found in the Black Sea weighing twenty pounds, also in the Caspian Sea in great numbers. They are capable of living in almost any kinds of water, that of bogs, swamps, etc. In Germany they have been known to live and thrive in water having a temperature of over 100° Fah. I have at the present time a small specimen that has lived in a ditch of brackish water for over two months.

On the approach of winter the carp form into groups of from fifty to one hundred, making a cavity in the muddy bottom, which is called a "kettle;" in this they hibernate till spring, huddled in circles with their heads together, the posterior part of the body held immovably. In this condition they do not take a particle of food, yet during their long winter's sleep they neither diminish nor increase in weight.

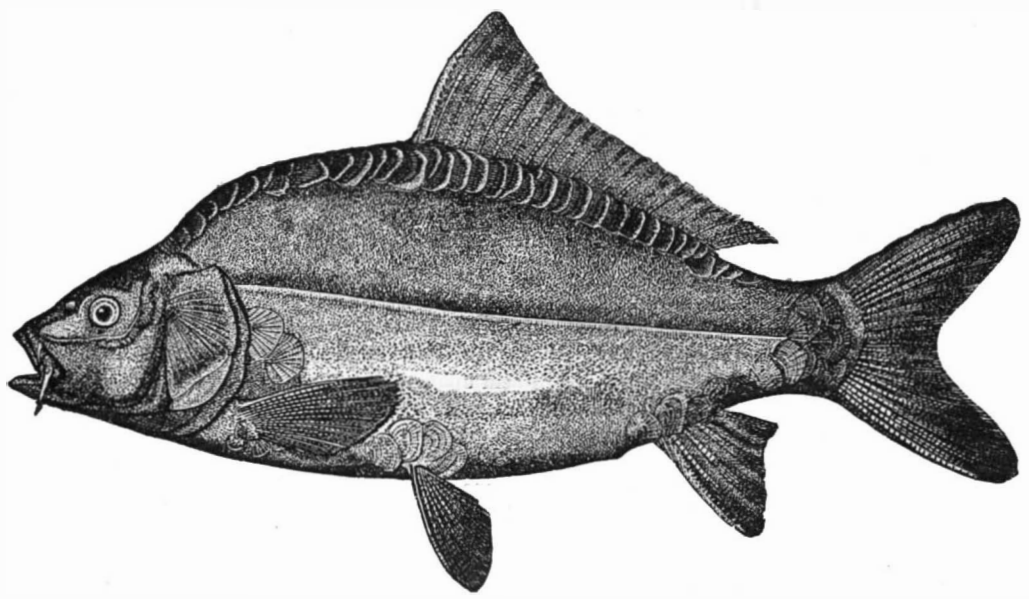
The carp leaves its winter home as soon as the water becomes warm. Spawning commences in May and continues through the warm months. Rainy and cool weather interrupts the spawning, which is again continued during warm and clear weather. The male, during the spawning season, displays a number of protuberances on the head and back. The pharyngeal teeth are cast some time before the breeding season; these are renewed every year. As the breeding season approaches the fish become more active, two or three male fish accompanying each female. The female swims more swiftly and keeps close to the surface, constantly followed by the males. This is called running spawning. The male fish follow the females close to the water's edge till there is hardly depth of water to swim in; they losing all their timidity and caution can be easily captured. They lash the water, twisting the posterior of the body energetically, and shoot through the water with short, tremulous movements of the fins. This is the moment when the female drops her eggs, which are instantly impregnated by the milter. As the female drops probably only from four hundred to five hundred at a time in order to gain rest, it will require days and weeks before she has given up her last egg.

The eggs of the carp are adhesive, and adhere in lumps to the object on which they are deposited.

Old carp have been taken in different parts of Europe weighing all the way from forty to ninety pounds. When this fish does so well in Europe, where it is forced to spend many months in its winter's sleep, and where natural food at best is scarce, what may we not expect of this wonderful and useful fish when introduced into the ponds and streams of the Southern States, where they can feed to repletion on the choicest of natural food all the year round, and where they will often spawn twice a year?

In the waters of Central Europe the carp, after its awakening from its long winter's sleep, seeks most diligently for the seeds of the white and yellow water lily, also the *Phellandricum aquaticum, Festuca fluitans*, etc. The waters of the United States abound in all these plants and many others, the seeds of which will serve the fish as food; for instance, the wild rice (*Zizania aquatica* and *Z. flaitans*), also the well known rice or "water oats," with its great riches of seeds, and many others which will yield food profusely, and which European waters do not possess.

Let us once more consider the extraordinary increase of weight of about one hundred per centum in the exceedingly short space of four months, for during the winter time it is banished by nature into its temporary tomb. This fish needs from fifteen to eighteen months of growth, to gain, at a low estimation, three pounds without being fed. There are some culturists who obtain in the same space of time fishes of four pounds weight; but they possess ponds of warm situation, which thaw early in the spring, and perhaps they assist nature by feeding the fish.



THE LEATHER CARP.

Up to the present time of writing over twenty-five thousand carp have been distributed from the Smithsonian carp ponds over all parts of the Union. The carp, being slow and sluggish in its movements, has many natural enemies, such as turtles, large frogs, snakes, eels, mink, and muskrats. Persons having carp ponds should keep a sharp lookout for these pests. Dr. Hessel says that he has seen three year old fish so crowded in ponds in Europe that they were principally head with a small body. Such stunted fish will never recover when placed in roomy ponds. Five hundred fish to an acre of water is about the right proportion; more than that number will not do well.

Some two years ago I received from one of the German steamers, through the kindness of Professor Beard, a number of small leather carp; none were mere than an inch and a half in length. These were placed in an aquarium of the proportion of four feet by two, which was supplied with slow running water. The few that are now left are from seven to eight inches in length, and have always been kept in the same tank.

These carp have passed through every conceivable trial. They have jumped out of the tank repeatedly, but have recovered rapidly from the wounds. Fungus has attacked them many times, forming in patches about the head, but it did not seem to make the least impression on their tough skin, and soon disappeared. On one occasion I placed one of these carp in a sea-water tank, the density of the water being eleven, to rid him of fungus; but being called away I forgot all about the carp till the next day, and was surprised to find him perfectly at home in his new element. Some "horse leeches" escaping from their tank through the strainers, concluded to settle down for life in the leather carp tank. When I discovered them in the tank, one of the carp (to which was attached a well-filled leech) was lying on its side nearly exhausted. And yet this fish recovered from its injuries.

Having a number of soft clams left over after feeding the fish, I placed them in a pickle of strong brine to keep till next day; but forgetting till the end of the week, they were more like India-rubber than the tender soft clam.

Being anxious to learn the digestive powers of the leather carp, for I had long been of the opinion that they could digest anything they could swallow, and thus far they had swallowed every variety of food, I concluded to give them a feed of the pickled siphons of the clams, of which they partook bountifully. In the next tank were a number of yellow perch, all in fine condition, these also partook of the clams. Well—half the perch died, but the carp are living.

These carp are so tame that they will take the ends of my fingers in their mouths.

I am indebted for much of the information contained in the above article to Dr. Hessel, of Washington, and to Mr. Eugene Blackford, of New York, for living specimens of the fish.

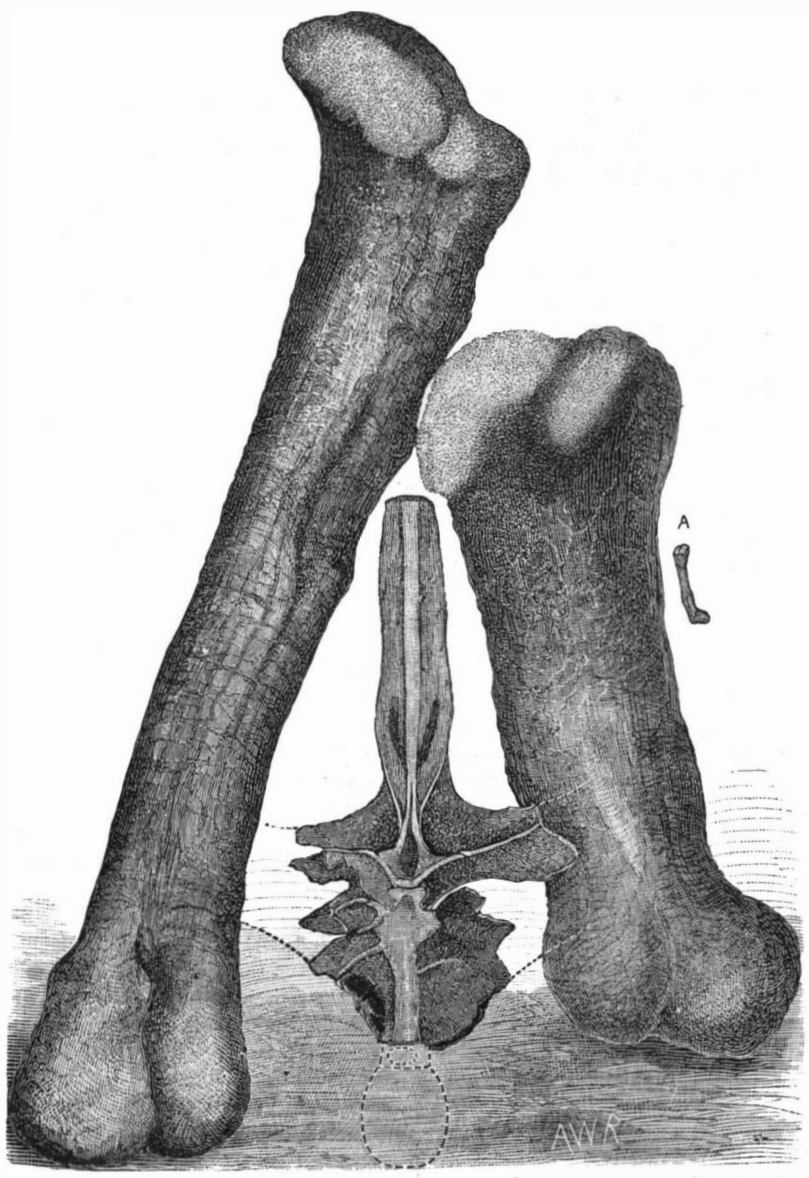
MONSTER BONES (FOSSILS) FROM THE ANCIENT CRETACEOUS SEAS OF KANSAS AND COLORADO.

BY C. F. HOLDER.

Among the recent additions to the geological department of the Museum of Natural History, Central Park, are some bones representing several large reptiles that existed during the cretaceous period of North America. The reader will remember that during this period—the time during which the Dover Cliffs of England and the green sand marl was deposited—the great plains of the West were the bottoms of a vast sea that found its eastern shore near the present site of Fort Riley, Kansas, and beat upon unknown sands far to the north, south, and west. The animals found in this era had arrived at the maximum of physical growth in all time, and the entire age is characterized by the enormous growth of its dependents. All of the species thus far discovered in the sands of Kansas and Colorado—and there are over fifty—have been referred to the reptiles and fishes, and are of the most gigantic proportions.

The late Prof. Mudge, of Kansas, has probably done more work in unearthing these extinct monsters than any other scientific man, and the fine collections in the Museum at Yale College and the specimens at the Central Park are legacies of his labor.

The largest specimens have been found near Cañon City, and are known to science as the *Clidastes, Camarasaurus, Amphicœlias*, etc. The first named was a veritable sea serpent of these ancient seas, and the huge bones and almost incredible number of vertebræ show it to have attained a length of nearly two hundred feet. Prof. Mudge states that while riding through the *Mauvaise Terres* of Colorado, he saw from his horse the remains of no less than ten of these monsters strewn upon the plain, their whitened bones bleached in the suns of centuries, and their gaping jaws armed with ferocious teeth, telling a wonderful tale of their power when alive.



MONSTER BONES FROM THE ANCIENT CRETACEOUS SEAS OF KANSAS AND COLORADO.

© 1880 SCIENTIFIC AMERICAN, INC

Some of the remains were found only partly weathered out, and could often be traced into the bed of a neighboring cliff, and, again, many of the large bones were scattered far and wide, probably by the gigantic sharks that infested the seas at that time. Many of the reptiles were allied to the crocodiles of the present day, and were wont to feed upon the banks of the great shallow seas. The thigh bone of one of these, the *Atlantosaurus*, is on exhibition at the Park, and is calculated to arouse the credulity of the most skeptical. It is over six feet in length, and looks more like a huge column for support than to assist locomotion. By its side is the same bone A six inches long—of the largest living crocodile of to-day, which rarely exceeds seventeen feet in length. Thus the question presents itself to the amateur restorer: If a crocodile with a thigh bone six inches long attains a growth of seventeen feet, how long would one be whose thigh bone exceeded six feet? The reader can easily surmise that the creature must have been of enormous dimensions, and scientific men have placed their length at over two hundred feet. Imagine an alligator of that length! But this is not the largest. We will place this estimate at one hundred feet; and since the discovery of the *Atlantosaurus* another huge form has been found which possesses a thigh over twelve feet in length, and although it would be obviously incorrect to take such a proportion to *determine* the physical increase, it points to an attainment of size that dwarfs the *heroic*.

Hotbeds made by Ants.

In the State of Colombia there is a large ant (*Atta cephalotes*) which causes a great deal of injury to plantations. It attacks and carries off indiscriminately all kinds of foliage, and no sort of vegetation seems to come amiss to it. The quantity of foliage carried off by these ants is immense; in quality it may be bitter, sweet, pungent, tender, or tough. Her Britannic Majesty's Acting Consul at Medellin, United States of Colombia, was led to mark carefully the uses to which the ants put this mass of vegetable matter which they convey to their nests, and he ascertained that they employ it to make hotbeds, upon which their eggs are deposited to be hatched by the heat produced by the fermentation of the leaves. The ants do not eat these portions for food, and the larvæ are fed upon a carefully selected diet. Once the brood is hatched, the ants clear away the hotbed, carrying out of their nest all the decomposed vegetable matter. This is thrown out in heaps apart, and in the large ant hills these heaps will contain bushels and upward. Many efforts have been made to exterminate these ants, at least in the vicinity of farms or gardens; but where the nests occur in plantings or in uncultivated grounds, all attempts have failed. Our consul, Mr. R. B. White, however, believes that he has discovered an efficaceous remedy, and it was shown to him by a negro. When a plantation or garden is attacked, all one has to do is to procure a quantity of the *débris* from the hotbeds thrown out of an ant hill entirely unconnected with that from which the invading ants proceed. Scatter this around the beds and on the ant roads, and the effect is marvelous. The ants seem seized with a panic; they drop their burdens instantly; the word seems passed along the roads, and empty-handed the whole of the invading army hurries off to its own nest. They will not return to the same place for many days, and even when they do they avoid all spots in which traces of this, to them, offensive matter remains. The smallest quantity will suffice, and a bushel will defend acres of ground. Mr. White, in a letter to the secretary of the Zoological Society of London, which is published in full in this society's proceedings, declares that he has seen this plan tried repeatedly, and it has never failed. The biggest army of ants—pioneers, engineers, directors general, and all—is utterly discomfited by this very simple means of defense. This plan is not generally known, even in the State of Antioquia (where these ants abound), and he thinks that our colonists might profitably be made acquainted with it.

Do Sharks Harbor their Young?

An interesting specimen of porbeagh shark (*Lamna punctata*) was caught recently off Great Neck, L. I. It was a female, and was sent to Mr. E. G. Blackford, of this city, who says: "When I received her she had not been dead more than seven hours. From the immense size of her stomach I though she must have swallowed a barrel or two of moss bunkers, and to gratify my curiosity I opened her. Imagine my surprise when instead of moss bunkers I found ten little sharks, evidently her offspring, and all just the same size—exactly two feet long. I should say they were about six months old, for a young shark when hatched from the egg measures about four inches. It has been a disputed question among fishermen for some time whether young sharks in time of danger do not seek safety in their mother's stomach. I think this case proves that they do, for the little ones were perfectly sound: there was no mark on them as if digestion had begun, and I have not a doubt but that if the mother had not been captured, as soon as the excitement was over the little ones would have worked their way out into salt water again, and in due time been big enough to give some unfortunate fisherman considerable trouble." The specimen measured six feet eleven inches in length, and was captured in a school of moss bunkers or menhaden.

Changing the Color of Flowers.

The natural color of flowers may be altered, according to C. Puscher, by exposing them to the diluted fumes of ammonia. Most of the blue, violet, and light crimson flowers turn to a splendid bright green. Dark crimson clove pinks turn black, other dark red flowers turn dark violet, all white flowers turn sulphur yellow. This change of color is especially beautiful when the flowers are variegated or the single petals possess a different color. As soon as the new color is fully developed, the flowers must be dipped at once in cold water, when they will keep their new shade for two to six hours; by degrees then their natural color returns. If flowers be exposed to the vapors of ammonia for one or two hours they turn a dirty chamois, which is permanent. Blue, violet, and red asters are dyed or turned intense red when they are exposed to the fumes of muriatic acid gas; it takes from two or four hours or more before the shade is fully developed. The flowers are then removed to dark, cool rooms to dry.—*Chemical Gazette.*

Picric Acid and its Adulterations.

Trinitrophenol, usually called picric acid, is a beautiful yellow dye much used in silk dyeing, and is, of course, often adulterated to enable the manufacturer to cheapen it.

Picric acid is slightly soluble in cold water, more so in hot water, and very soluble in alcohol. It melts at 122·5° C. (252½° Fah.). If carefully sublimed it leaves no residue. The most common adulterations are: Oxalic acid, resinous substances, saltpeter, niter, and Glauber salts.

The presence of oxalic acid in small quantities cannot be looked upon as an adulteration, because when picric acid is made by the action of nitric acid upon phenol, indigo, or the resin of *Xanthorrhœa hastilis*, more or less oxalic acid is always formed by the oxidation going too far. In crystalline form the white prismatic oxalic acid crystals are easily distinguished under the microscope from the brilliant yellow scales of picric acid. If it is in a powder, a solution is made, ammonia added, and then chloride of calcium. A white precipitate indicates oxalic acid.

Resinous substances are not directly and intentionally adulterations, as they are often present when the preparation is not very exact and careful, but they are injurious in dyeing, and the consumer must take the following precaution: The picric acid is dissolved in hot water and 1 part of chemically pure sulphuric acid added for every 2,000 parts of picric acid, stirring until completely dissolved. If resin is present it will separate; it is then filtered and sulphuric acid again added, which precipitates the last trace of resin. After a second filtration it is perfectly pure, and may either be used in solution or left to crystallize out. By this method Winkler found from 0·01 to 0·03 per cent of resin in different kinds of picric acid.

Potash and saltpeter are detected in different ways. First, by means of the microscope; secondly, by the blue cobalt glass: potash salts imparting a violet color to the colorless flame, soda a yellow. The third and best test is to put the picric acid in a test tube and add absolute alcohol. On shaking and slightly warming, the picric acid dissolves, but saltpeter does not.

Glauber salt is easily detected in the same manner as any other sulphate. The picric acid is dissolved in warm water, some chemically pure hydrochloric acid added, and then a solution of chloride of barium. A white precipitate of sulphate of barium shows the presence of a sulphate, probably the sulphate of soda, Glauber salt.

The above tests, by Dr. H. Kraetzer, are so simple that every dyer can repeat them for himself.

What the Atmosphere Contains.

M. Gaston Tissandier, of elevated ballooning notoriety, says a correspondent of the *Kansas City Review*, has revealed many interesting facts on atmospheric dust, its connection with cosmical matter, and the important role it plays in fermentation and decomposition. As the air is purer after being washed by rain, so in dry weather, and especially in cities, the atmosphere is a veritable dust bin. We are sensible to the existence of these particles of attenuated matter; in breathing them they disgust us, and in falling and remaining on clothing and furniture they demonstrate not only their presence but their plenitude. Admit a sunbeam into a darkened room and the molecules will be revealed like nebulæ; yet the numbers we perceive are perhaps but the minimum of what exists, for after the naked eye and the microscope there are minutiæ which dance still. Much of this atomic *débris* is of inorganic origin, and a great deal is derived from animal and vegetable sources. The renowned experiments of M. Pasteur have demonstrated that among these atomies which live, move, and have their being in the air, are germs or spores of fermentation and decomposition, that is to say, the seeds of disease and death. Showers of dust impalpable as flour, and sometimes red as blood, have fallen in several parts of the world, astonishing or frightening, as the populations are superstitious or cultivated. These showers are simply silicious particles whipped up to the superior regions of the atmosphere, and driven along by aerial currents. Such particles have been lifted in Guiana and showered on New York, the Azores, and France, as Ehrenberg detected therein animalcula and shells peculiar to South America. Over the summits of the high mountains of the latter country the atmospheric currents are ever charged with silicious powder, and in parts of Mexico the crests of mountains act as veritable bars, and compel the deposition from these air streams of the dust, and which accumulate in the valleys to the depth of ninety yards. Geology recognizes these atmospheric deltas.

The foam of waves as they dash against the coast is pulverized into feathery pellicles, which float skyward with a trace of saline matter and that a sea breeze carries far inland. Space contributes as well as earth and ocean to the production of aerial dust. When meteorites and falling stars are rendered luminous and incandescent by their rubbing against strata of air in their vertiginous flight, they part with quantities of their metallic elements in the form of powder, iron, nickel, and cobalt, substances that Nordenskjöld has gathered on the virgin snow of the Polar regions. When atmospheric dust, whether collected directly on a sheet of paper, or from the sediment of snow and rain, is probed by a magnet, the tiny particles of iron attracted have all a spheroid family likeness, resembling furthermore iron filings if melted in a flame of hydrogen, or the extinguished sparks that fall on striking an ordinary flint and steel. Nay more, similar atoms of meteoric iron have been traced in the Lower Lias formation, geology thus affording evidence, that as now, so before the appearance of man on earth, atmospheric dust existed.

The air is a vast storehouse of animalcules. Expose a solution of some organic substance to the atmosphere for twenty-four hours, it will be speedily inhabited by myriads of infusoria, rolling and tumbling, yet so small that hundreds of them if placed in a row would not form a line in length. These worms resemble little eels. Analogous animalcules induce decomposition and fermentation, for the latter cannot take place unless the organic matters be in contact with the air, to receive the seed of the leaven, which by cellule propagation leavens the whole mass.

It has lately been shown that the process of nitrification in certain soils is due to a peculiar ferment, that is to say, to a spore floating in the atmosphere, and finding its conditions for action stops and operates.

Marsh fever is due to cellules or spores existing in a bog neighborhood. The same spores have been detected by the microscope in the expectorations of the patient, in the dew that was examined, and on the surface of the peaty soil where they were generated. This is simply poisoning. To a like cause is due the fell disease known as hospital gangrene; the germs in the polluted ward atmosphere enter the wounds, induce putrefaction and death. Hence the importance of washing the affected part with carbolic acid or other antiseptic; then dressing it with a wadding that will intercept, by acting as a filter, the germs to be deposited, from being sown.

In many factories workmen become victims to the dust, generated by their special industry, entering and saturating the lungs. On dissecting old colliers, their lungs, after forty years' respiration of dust, instead of being rose colored as in health, were as black as the coal itself. The dust in this impalpable form is often the cause of accidents; it can take fire and blaze like alcohol. Witness the catastrophe at the Minneapolis flouring mills; the confined air highly charged with the flour became on a par with ether or alcohol, awaiting only ignition from the heated millstone to burst into flame and explode.

The Treatment of Burns.

Service of Dr. George F. Shrady, at St. Francis' Hospital, New York.—A number of cases of more or less severe burns have been treated very successfully by an application of a gum dressing, which consists of a paste composed of gum acacia, ℥ iij.; gum tragacanth, ℥ j.; carbolized water (1–60), 1 pint; and molasses, ℥ ij. It is applied to the burned surface with a broad flat camel's hair brush immediately on admission to the hospital, and dries in the course of an hour or two. The dressing is then renewed at suitable intervals, until a firm and unyielding scab is formed. Generally four applications are necessary for this purpose. The molasses appears to prevent the contraction of the covering, while the carbolized water destroys any odor.

The application is not attended with any pain to the patient, and effectually excludes all air to the burned surface, thus avoiding subsequent smarting. The scab cracks and peels off in the course of a fortnight, either leaving a mere rubefaction or a healthy granulating surface. If pus accumulates in the mean time under the scab, the latter is either punctured or gently lifted, giving exit to the discharge. No other dressing is required. Although forming a rather unsightly scab, the dressing is really a cleanly one. This plan of treatment is substantially the same as that advocated by the late Dr. Gurdon Buck, and, all other things being equal, is considered to give the best results. Its special advantages are its ease of application, the small amount of subsequent dressing required, and the freedom from pain. The granulating surfaces are treated with either simple cerate or the white oxide of zinc ointment, according to indications.

Genuine Hall Marks on Spurious Plate.

The rage for antique silverware in England has developed an ingenious method of swindling, which has just been discovered by the Goldsmiths' Company of London. The fraud is effected by cutting out genuine hall marks from small but antique articles of silverware and inserting them on large pieces of wholly modern plate. Thus the bottom of a salt cellar, say of Queen Anne's time, is dexterously removed and worked into the fabric of a tankard, a soup tureen, or some equally massive object in silver recently manufactured, and the sham antique—the authenticity of its hall mark defying all the ingenuity of experts—thus passes muster as having been made one hundred and eighty years ago, and commands a corresponding enhancement in price. One dealer of this sort has lately been convicted and sentenced to a heavy term of imprisonment.

© 1880 SCIENTIFIC AMERICAN, INC

Our Cows and their Value.

At the late convention of the American Butter and Cheese Association, the President of the Northwestern Dairymen's Association, Hon. G. P. Lord, of Elgin, Ill., read a paper in which he estimated the number of milch cows in the United States at over 13,000,000, requiring the annual product of 52,000,000 acres of land for feed, giving employment to 650,000 men, and requiring the labor of 866,600 men. Estimating the cows at $30 each, the horses $80, and land at $30 per acre, together with $200,000,000 for agricultural and dairy implements, and the total amount invested in the industry is $2,219,280,000. This is considerably more than the amount invested in banking and the commercial and manufacturing interests of the country, which is $1,800,964,586. The cattle and horses will require two tons of hay annually or its equivalent. If it is estimated that 5,000,000 cows are fed with grain for winter dairying, and that the horses daily require six quarts of oats or corn during the year, they will consume 28,383,300 tons of hay, 84,380,000 bushels of corn meal, 84,370,000 bushels of oat meal, 1,250,000 tons of bran, 30,000,000 bushels of corn, and 300,000,000 bushels of oats, of a total value of $384,459,400. To this should be added the labor of 650,000 men at $20 per month, $156,000,000, making the annual value of $504,459,400, or an average of $38.80 per cow.

Accepting 12 cents per gallon as a basis for computing the value of the milk product, and 446 gallons the average yield per annum (this being the average in sixteen States in 1860), the 13,000,000 cows produce annually 5,793,000,000 gallons of milk, worth $695,760,000. Analysis shows that 3½ pounds of milk contain the same kind and amount of nutrition as 1 pound of boneless beef. The total weight of the milk product is 50,732,600,000 pounds, equal to 14,495,000,000 pounds of boneless beef. About 50 per cent of a fat steer is boneless meat, so that it will require 20,650,000 steers of 1,400 pounds weight to produce the same amount of nutrition as the annual milk product. Such fat steers would sell at $4.50 per cwt., or $63 each—a total of $1,300,950,000; deducting for hide and tallow, $260,190,000, leaves the meat value $1,040,760,000. This gives the food value of the milk product in the United States annually. Willard, in his "Practical Dairy Husbandry," says that milk at 24 cents per gallon is equivalent in value to boneless beef at 9 cents per pound." It is false economy, therefore, that substituted meat for milk as an article of food.

The same authority (Willard) states that 50 per cent of the milk is used in making cheese and butter, and 41 per cent is consumed in a liquid state. The Department of Agriculture, 1877, estimates there are 1,000,000,000 pounds of butter and 300,000,000 pounds of cheese made annually in the United States. At 27 pounds of milk for 1 pound of butter, and 9½ for 1 pound of cheese, the total amount of milk used would be 29,950,000,000; add 41 per cent of the product for consumption, the total production is 50,752,325,000 pounds, within a small fraction of 1 per cent of the estimate made.

The caseine in the milk used for making butter, if utilized for cheese, would produce annually 1,890,000,000 pounds, and besides there is annually run off in the skimmed milk, buttermilk, and whey 200,000,000 pounds of milk sugar, which, if saved, would have a market value greater than the entire annual sugar crop of Cuba.

New Jersey Scissors in Sheffield.

A correspondent of the Portland (Me.) *Advertiser* relates as follows his experience in looking for a proper souvenir of Sheffield, England, famous for its cutlery:

"Every other shop in the place seemed to be a cutler's shop—and into one of the best of these I ventured, requesting to look at scissors. It is a hobby of the English shopkeeper to show his cheapest goods first, no matter who his customer may be. Enter a shop in pursuit of something really good, for which you are willing to pay, and it generally takes three or four strong efforts to obtain it—he will persist in showing you all the cheapest grades first. So tray after tray of common cheap scissors was displayed on the counter. "Have you nothing better than these?" I asked, at last. "I am buying these scissors for Sheffield's sake, and I want a good pair." Out came another case, still in no way fine goods. I had already looked at five or six grades. "If these are your best," I said, "I will look further on." "Oh," said the shopman, "we have one more kind—very fine goods indeed, the best in the shop, but they are quite expensive," and he unlocked a drawer and took out a tray of really good scissors. I took up a pair to examine them, and read, stamped on the blade, "Newark, New Jersey!" As I could not reconcile myself to take a pair of New Jersey scissors as a souvenir of Sheffield, I was obliged to leave the disgusted shopman to lock up his precious scissors again, probably more than ever grounded in his belief that the high price of his goods was my reason for not purchasing.

Pennsylvania Tanneries.

The largest hemlock tanning in the world is now done between Sterling Run and Warren, Pa., along the line of the Philadelphia and Erie Railroad. The district includes thirteen tanneries in Cameron, Elk, McKean, Forest, and Warren counties. Large tracts of land in these counties are covered with a dense growth of hemlocks. Little clearings are made in the wilderness, a tannery is erected on some splendid trout stream, and an unpainted village springs up within a few months. The thirteen tanneries have facilities for tanning 775,000 hides a year. This would produce 1,550,000 sides of sole leather, averaging 17 pounds to the side, and aggregating 26,350,000 pounds of leather a year. At a fair average, the hides weigh 21 pounds a piece; so that the 775,000 go to the tanneries with an aggregate of 16,275,000 pounds, and emerge in the shape of sole leather weighing 26,350,000 pounds. This gain of 10,075,000 pounds is made in the face of fleshing, hair scraping, and trimming. It is made by the absorption of the tannin leached from ground hemlock bark.

These tanneries almost exclusively use South American dry hides, worth, on an average, 23 cents a pound. The 775,000 hides, therefore, cost $3,742,250. The leather averages 25 cents a pound, and the hides that cost $3,742,250 turn out leather that sells for $6,587,500, the gain in value being $2,845,250. All this, however, is not net profit. It represents the labor of nearly 1,500 men at an average of $1.25 a day for 312 days a year, and the value of 155,000 cords or 340,000,000 pounds of hemlock bark, worth from $4 to $4.50 a cord delivered. The aggregate of the cost of labor is $585,000, and that of the cost of the bark $658,750, a total of $1,243,750. This leaves for the tanners $1,591,500, out of which come taxes, cost of acids, wear and tear of machinery, fuel, lights, insurance, and other incidental expenses, leaving a fair profit at the bottom. The bark runs 2,200 pounds to the cord, and a cord will tan about ten sides of leather.—*New York Sun.*

The Silvering of Mirrors.

The methods of silvering mirrors, as practiced in Europe, are described as follows by Mr. C. Colné in his report upon glass at the late Paris Exhibition:

Silvered plate glass is produced by causing a slight coating of mercury to adhere to the glass. To obtain this result mercury must be retained by a metallic medium; it is, therefore, amalgamated with tin. Mercury, owing to its power of reflecting light very brightly, has been chosen as the best medium.

The operation of silvering is briefly as follows:

Upon a very smooth stone table a sheet of very thin tin is spread very carefully, so as to prevent all wrinkles. Upon this sheet mercury is rubbed all over, then as much mercury as the sheet will retain is poured over it. The glass plate is now carefully slid over the edge of the stone table, as near as possible to the mercury, and lowered on it. All the parts previous to this operation have been carefully cleaned, and the plate is handled with pieces of tissue paper to prevent the introduction of dirt. The plate is now covered with a cloth and loaded with weights to expel the surplus mercury. When the plate has been so weighted, the table is slightly inclined, and gradually increasing the inclination from time to time, until the mercury has been sufficiently drained; this generally requires twenty-four hours. The plate is now carefully taken up and carried over to an inclined wooden table, which is depressed gradually more and more to finish draining the mercury until the plate is supposed to be dry.

This is the process which has been heretofore followed altogether, but of late plates have been silvered with a dissolution of silver. Mercury has deplorable effects upon the health of workmen, as they are exposed to its dangerous emanations; these are rapidly absorbed by the skin and produce the well known and terrible mercurial poisoning. It is hoped, therefore, that mercury will be abandoned, and the new silvering process described below will be adopted in its place. Several methods have been proposed for silver dissolutions, all springing, however, from the discovery of Liebig, that aldehyde (produced by a partial oxidation of alcohol) when heated with nitrate of silver, the metal revivified, covers the glass over with a brilliant metallic coating. It is not our purpose to trace the different improvements made by Drayton and Pettitjean, but we will briefly indicate the process of the latter, which is now altogether used by the St. Gobain works with perfect success.

The operation is very similar to silvering with mercury. The table, instead of being a stone, is a hollow sheet iron table, made quite smooth on its upper surface, and containing inside water heated by means of steam, to bring the temperature to 95° or 104°. Preparatory to silvering the glass it should be thoroughly cleaned. The table being ready, a piece of oilcloth is spread over it, and upon this is laid a piece of cotton cloth. The plates are now put upon these cloths, and the following solutions are poured over them:

Liquor No. 1.—Dissolve in a liter of water 100 grammes of nitrate of silver; add 62 grammes of liquid ammonia of 0·880 density; filter and dilute with sixteen times its volume of water. Then pour in this liquor 7·5 grammes of tartaric acid dissolved in about 30 grammes of water.

Liquor No. 2.—This liquor is precisely the same as the other, with the exception that the quantity of tartaric acid is doubled, say 15 grammes.

First pour of liquor No. 1 upon the plates as much as will remain upon the surface without running over. The heat of the table is now increased gradually to 95° or 104° Fah., and in about thirty minutes the glass is covered over with a metallic coating. The table is now inclined and the plates washed with water, which carries off the surplus silver. The table is again raised, and liquor No. 2 is now poured over. In about a quarter of an hour another coat is deposited, which covers the glass completely. The plates are again washed; then they are carried to a slightly heated room, where they are gradually dried.

This operation, as will be seen, is quite simple, and is generally performed by women. The silver carried off in washing and that contained in the cloths is recovered again. Since glass silvered by this process is liable to be altered when exposed to the air, and the coating may become easily detached if not covered over with a protecting coat of paint, the silver pellicle is covered with an alcohol copal varnish, put on with a brush, and when this is dry a coat of red lead paint is put on.

Plates silvered by this means have more brilliancy than with mercury, but as there is a slight tinge of yellow given to objects reflected by these mirrors, they were at first objected to. This objection has passed away, however, to a great extent, and the yellow reflection has been obviated by giving a slight coloration to the glass. I have not been able to get positively the relative costs of both processes; it is said, however, that by the new process the cost price is about 36 cents per square meter. Owing to the fact that such works as the St. Gobain have adopted it, and as the terrible disorders caused by mercury have been avoided, there ought to be no hesitation in adopting this new process everywhere.

The Use of Salt in a Dry Time.

A correspondent in the Chicago *Times* gives the following account of his experience with the use of salt in the garden and orchard. Young fruit trees can be made to grow and do well in places where old trees have died, by sowing a pint of salt on the earth where they are to stand. After trees are set I continue to sow a pint of salt around each tree every year. I set twenty-five trees in sandy soil for each one of seven years, and only succeeded in getting one to live, and that only produced twigs a few inches long in nine years. Last spring I sowed a pint of salt around it, and limbs grew from three to three and a half feet long. In the spring of 1877 I set out twenty-five trees, putting a pint of salt in the dirt used for filling, and then sowed a pint more on the surface after each tree was set. All grew as if they never had been taken from the nursery. Last spring I set thirty more, treating them in the same way, and they have grown very finely. The salt keeps away insects that injure the roots and renders the soil more capable of sustaining plant growth.

In 1877 my wife had a garden forty feet square. It was necessary to water it nearly every day, and still the plants and flowers were very inferior in all respects. In 1878 I put half a barrel of brine and half a bushel of salt on the ground, and then turned it under. The consequence was that the plants were of extraordinarily large size and the flowers of great beauty. It was not necessary to water the garden, which was greatly admired by all who saw it. The flowers were so large that they appeared to be of different varieties from those grown on land that was not salted.

I had some potatoes growing from seed that wilted down as soon as the weather became very hot. I applied salt to the surface of the soil till it was white. The vines took a vigorous start, grew to the length of three feet, blossomed, and produced tubers from the size of hen's eggs to that of goose eggs. My soil is chiefly sand, but I believe that salt is highly beneficial to clay or common prairie land.

[The above makes a very nice story; but one of our correspondents, a lady, tells us that she lately tried the salting plan on her flower beds, and in a few days all the plants were dead. The use of salt for killing weeds is well known. —EDS. S. A.].

Dr. Unger's Cure for Drunkenness.

The claims of Dr. Unger for a remedy for curing intemperance would seem to be justified, if we may rely upon as good authority as the Chicago *Tribune* for the evidence. Mr. Joseph Medill, the editor, is said to be a strong indorser of the new remedy, and from the editorial commendations of it in the columns of the *Tribune* we conclude the remedy has produced some benefit to the community already. It is claimed that the doctor has cured 28,000 persons of the worst form of intemperance with it, and that this is the first remedy ever discovered that kills the disease and the inclination to drink at one and the same time.

Remedy.—Take one pound of best, fresh, quill red Peruvian bark, powder it, and soak it in one pint of diluted alcohol. Afterward strain and evaporate it down to half a pint. Directions for its use: Dose—a teaspoonful every three hours the first and second day, and occasionally moisten the tongue between the doses. It acts like quinine, and the patient can tell by a headache if he is getting too much. The third day take as previous, but reduce the dose to one-half teaspoonful. Afterward reduce the dose to fifteen drops, and then down to ten, and then down to five drops. To make a cure, it takes from five to fifteen days, and in extreme cases thirty days. Seven days are about the average in which a cure can be effected.

A Treasure Wagon.

The removal of the Bureau of Engraving and Printing, at Washington, to a building half a mile from the Treasury has made it necessary to provide new arrangements for the transfer of money and bonds between the two establishments. The department has had constructed a heavy, van-like wagon, a sort of vault on wheels, built of iron and steel, and arranged internally like a bank vault with a sheet iron lining. The doors are fastened with tremendous bolts, and the locks are of the combination order. The body of the vehicle is painted an olive color with gilt ornamentation. When drawn through the streets by two immense horses it attracts considerable attention, especially as it is always accompanied by five armed agents of the Treasury Department, two guarding the front and three the rear.

© 1880 SCIENTIFIC AMERICAN, INC

Astronomical Notes.

Observatory of Vassar College.

The computations in the following notes are by students of Vassar College. Although merely approximate, they are sufficiently accurate to enable the ordinary observer to find the planets. M. M.

POSITIONS OF PLANETS FOR AUGUST, 1880.

Mercury.

On August 1 Mercury rises at 5h. 44m. A.M., and sets at 7h. 6m. P.M.

On August 31 Mercury rises at 4h. 10m. A.M., and sets at 5h. 59m. P.M.

Mercury is at inferior conjunction on the 5th, and at greatest elongation on the 21st, rising before the sun, and some five degrees north of sunrise point. Mercury is in perihelion on the 29th.

Venus.

Venus keeps so nearly the path of the sun in August that it is not likely to be seen.

On the 31st it sets after the sun, a few degrees south of the point of sunset.

Mars.

On August 1 Mars rises at 7h. 19m. A.M., and sets at 8h. 36m. P.M.

It may still be seen early in the month. It moves from Rho Leonis toward Tau Leonis.

Late in the month Mars sets before the sun. The crescent moon will pass south and east of Mars on August 8.

Jupiter.

On August 1 Jupiter rises at 10h. 6m. P.M. On August 31 Jupiter rises at 8h. 7m. P.M.

Jupiter will be so brilliant this autumn, as it approaches perihelion, that the most careless observer cannot fail to notice it in the evening sky.

If we take the hour from 9 to 10 P.M. for observing Jupiter, an ordinary telescope with an object-glass only two inches in diameter will show the satellites and their changes of position.

On the 23d the first satellite will disappear by going into the shadow of Jupiter, as the moon goes into the earth's shadow in a lunar eclipse.

On the 24th the same satellite will be invisible when Jupiter rises, because it is moving across the face of Jupiter. It will be seen to come off on the left or preceding limb of the planet.

On August 31 the same satellite will be seen between 9 and 10 P.M. moving toward Jupiter and entering upon the disk of the planet. A telescope with an object-glass of five inches diameter will enable one to see the dark shadow of these satellites pass across the face of Jupiter, as the shadow of the moon passes across the earth in a solar eclipse.

Jupiter will be about seven degrees south of the waning moon near midnight on August 23.

Saturn.

Saturn rises on August 1 at 10h. 34m. P.M. On August 31 at 8h. 36m. P.M., following Jupiter after nearly half an hour. The two planets separate a little in declination, Jupiter moving south a little faster than Saturn.

Like Jupiter, Saturn increases in brilliancy, and although far less conspicuous than Jupiter, will make the evenings of August very beautiful.

The waning moon rises nearly with Saturn on August 24.

A telescope of a few inches aperture will show Titan, the largest moon of Saturn, and the motions can be followed around the planet. A glass of five inches aperture will show Rhea, and on rare evenings, and when Saturn is on the meridian, Tethys may perhaps be seen.

Uranus.

Uranus rises and sets so nearly with the sun that it is useless to attempt to observe it in August.

Neptune.

On August 1 Neptune rises at 11h. 11m. P.M., and on the 31st at 9h. 13m. P.M.

It cannot be seen with a disk without the aid of a powerful glass.

South American Glaciers.

The English mountain climber, Mr. Whymper, writes to his friends that his last ascents in South America have been the mountains of Cayambe, Saraurcu, and Cotocachi. He has found very extensive glaciers on all these mountains, besides having previously discovered others on Chimborazo, Sincholagua, Antisana, Cotopaxi, Illiniza, Carihuairazo, and Quilindaña. How little is at present known of the Andes of Ecuador, the *Pall Mall Gazette* remarks, may be judged from the fact that in the edition of the "Encyclopædia Britannica" now appearing, in the article on Ecuador it is stated that the crater of the mountain Altar is remarkable as containing "the bed of the only real glacier known to exist in the Ecuadorian Andes." Mr. Whymper says that there are no glaciers upon Corazon, Imbabura, or Pichincha, but that among those upon the mountains which we have enumerated above there are many glaciers which are as large as the largest Alpine ones, and that the upper four thousand feet of Cayambe, Antisana, and Chimborazo, are almost completely enveloped by them.

Extensive Electric Light Experiments.

We learn from the *Paper World*, published at Holyoke, Mass., that Mr. H. C. Spaulding, of Boston, who was at first going to put his plans into effect in that city, has gone to Holyoke on account of the cheap power, and has made arrangements with the Water Power Company to put a wheel into their new pit expressly for his use. To make the experiment which he will attempt will require 150 horse power, enough to run a paper mill. A tower about 175 feet high will be built and surmounted by an immense lantern of such power, says the enthusiastic editor, as to put all former electric lights completely into the shade. Mr. Spaulding will put up this tower and apparatus at his own expense, but he hopes to succeed so well that the city will adopt the system. His idea is that by filling the atmosphere above the city with light from several such electric towers he will get the same effect that we do from the sun and its reflected light, and that the shadows will be no darker than are those made by the sun. His idea is to fill the stratum of atmosphere just above the city so completely with light that it will permeate spaces which no direct rays reach, just as the sun's light does immediately after the sun has set.

The light which he expects to throw out from one lantern will be equal to 300,000 candles, while the largest electric light yet attempted by any one else has been of but 10,000 candle power. The estimated cost of the apparatus is $15,000, irrespective of any investment for power, but after the system is once in operation the cost of running it, aside from the power, will be small. The expense of lighting Holyoke at present, public and private, is estimated at $100,000 a year, and for about that amount the seven towers which are proposed could be set up and the lights put into operation.

The Air Breathed in Leadville.

Dr. H. Steinau, of Leadville, Col., sends to the *Medical Record* an interesting article upon the above subject. It has been asserted that the atmosphere of Leadville, which is 10,500 feet above the level of the sea, is poisoned by the smoke and gases from the numerous smelters, of which there are about twenty, in the neighborhood of the city. Dr. Steinau has examined into the question, and comes to the conclusion that the amount of deleterious vapor, though large, is quantitatively insufficient to produce any poisonous effects. The gases from which danger is to be apprehended are those containing lead, sulphur, chlorine, and arsenic. Estimating that each of the twenty furnaces around the city consumes thirty tons of ore per day, he finds that about ten ounces of chlorine, eighty pounds of sulphurous acid, and eighty ounces of arsenious acid would be given off every minute of the twenty-four hours. Most of the chlorine, however, unites to form solid chlorides; more than half of the arsenious acid fails to escape into the air, but is found in a solid condition in the speiss. The sulphurous acid is so diluted by the air that its presence is scarcely noticeable. The lead vapors are the most harmful, but their amount is small, and they can easily be prevented from escaping into the air. The conclusion, then, is that the furnaces are not sources of danger from their poisonous emanations. This conclusion is confirmed by practical experience, as no cases of lead or arsenic poisoning have been found.

Dr. Steinau is of opinion that Leadville is in much greater danger from its neglect to care for the drainage of the city and the disposal of filth. Nothing, he thinks, but the great natural salubrity of the place, with the high percentage of ozone in the air, has prevented an epidemic from occurring already.

Poisonous Effects of Alcohol.

We often hear it stated that pure liquors are much less injurious than those which are adulterated, and that much of the injury caused by alcoholic liquors is due to impurities. M. Dujardin has carefully determined by experiment the quantity of the various alcohols and similar substances, which are formed by fermentation or during distillation, required to produce death within twenty-four to thirty-six hours after injection. It will be seen that ethyl alcohol (or common alcohol) and glycerine are the most harmless, while amyl alcohol, the principal constituent of fusel oil, is the most deleterious. Glycerine differs from alcohol, in that it increases the bodily temperature, while alcohol lowers it. The results are given in grammes per kilo of the animal.

Classification.	Name of alcohol or derivative.	Pure.	Dilute.
Formed by fermentation.	Ethyl alcohol	8·00	7·75
	Acetic aldehyd	—	1 to 1·25
	Acetic ether	—	4·00
	Propyl alcohol	3·90	3·75
	Butyl alcohol	2 00	1 85
	Amyl alcohol	1·70	1·50 to 1·60
Non fermented alcohols.	Methyl alcohol, pure	—	7·00
	Common wood spirits	—	5·75 to 6
	Aceton	—	5 00
	Œnanthic alcohol	8	2·50
	Caprylic alcohol	7 to 7·50	2 to 2·25
	Cetylic alcohol	—	—
Isomeric.	Isopropylic alcohol	—	3·7 to 3·8
Triatomic.	Glycerine	—	8·5 to 9

The contamination with higher boiling products, and the consequent injuriousness, increases in this order: 1. Brandy from wine. 2. Brandy from pears. 3. Brandy from apples. 4. Brandy from sugar beets. 5. Liquor from grain. 6. Liquor from beet sugar molasses. 7. Potato spirits. The brandy made from wine contains almost pure ethylic alcohol, and is therefore least injurious.—*Ding.*, *p.* 406.

Courage Necessary to Success.

As the St. Louis *Journal of Commerce* pertinently says, a great deal of talent is lost in the world for the want of a little courage. Every day sends to the grave a number of obscure men, who have only remained in obscurity because their timidity has prevented them from making a first effort, and who, if they could have been induced to begin, would in all probability have gone great lengths in fame. The fact is, to do anything in the world worth doing, we must not stand back shivering and thinking of the cold and danger, but just jump in and scramble through as well as we can. It will not do to be perpetually calculating risks and adjusting nice chances. It did very well long before the flood, where a man could support his friends upon an intended publication for a hundred and fifty years, and then live to see its success afterward. But at present a man waits and doubts, and hesitates, and consults his brother, and his uncle, and his particular friends, until one day he finds he is sixty years of age; then he has lost so much time in consulting his first cousin and particular friends, that he has no time to follow their advice.

The Manufacture of Resin and Turpentine.

The turpentine and resin industry carried on at the South is much larger than probably most persons are aware. From the *Manufacturer and Builder* we glean the following account of the collecting of the gum and its conversion into a merchantable commodity

From Wilmington, N. C., southward, and nearly all the way to Florida, the pitch pine trees, with their blazed sides, attract the attention of the traveler. The lands for long stretches are almost worthless, and the only industry, beyond small patches for corn or cotton, is the "boxing" of the pitch pine trees for the gum, as it is called, and the manufacture of turpentine and resin. There are several kinds of pine trees, including the white, spruce, yellow, Roumany, and pitch pine. The latter is the only valuable one for boxing, and differs a little from the yellow pine, with which it is sometimes confounded at the North. The owners of these pine lands generally lease the "privilege" for the business, and receive about $125 for a crop, which consists of 10,000 "boxes." The boxes are cavities cut into the tree near the ground, in such a way as to hold about a quart, and from one to four boxes are cut in each tree, the number depending upon its size. One man can attend to and gather the crop of 10,000 boxes during the season, which lasts from March to September. About three quarts of pitch or gum is the average production of each box; but to secure this amount, the bark of the tree above the box must be hacked away a little every fortnight. Doing this so often, and for successive seasons, removes the bark as high as can easily be reached, while the quality of the gum constantly decreases, in that it yields less spirit, as the turpentine is called, and then the trees are abandoned. The gum is scraped out of the boxes with a sort of wooden spoon, and at the close of the season, after the pitch on the exposed surface of the tree has become hard, it is removed by scraping, and is only good for resin, producing no spirit. The gum sells for $1.50 a barrel to the distillers. From 16 barrels of the crude gum, which is about the average capacity of the stills, 80 gallons of turpentine and 10 barrels of resin are made. The resin sells for from $1.40 to $5 per barrel, according to quality, and just about pays for cost of gum and distilling, leaving the spirit, which sells for 40 cents a gallon, as the profit of the business. Immense quantities of resin await shipment at the stations along the line, and the pleasant odor enters the car windows as you are whirled along.

After the trees are unfit for further boxing, and are not suitable for lumber, they are sometimes used to manufacture tar; but the business is not very profitable, and is only done by large companies, who can thus use their surplus labor. The trees are cut up into wood, which is piled in a hole in the ground and covered with earth, and then burned the same as charcoal is burned elsewhere. The heat sweats out the gum, which, uniting with the smoke, runs off through a spout provided for the purpose. A cord of wood will make two barrels of tar, which sells for $1.50 per barrel, and costs 37½ cents to make. The charcoal is then sold for cooking purposes.

Medical Lakes of Eastern Washington.

In the neighborhood of Silver Lake, and about sixteen miles southwest of Spokane Falls, Washington Territory, are two small lakes, known as the medicated lakes, which are likely to become a great resort for invalids.

One lake is a mile and three-quarters long and three-quarters of a mile wide; the other a trifle smaller. They are about a mile apart. For ordinary bathing they are said to be delightful. The water invigorates and refreshes the whole system and leaves the skin soft and oily.

An analysis of these waters, by Dr. R. G. Rex, of Portland, Oregon, shows the following constituents:

Granite Lake.—Solid matter, 256 grains to the gallon, consisting of carbonate of soda and potassa, 160 grains; chloride of sodium and potassium, 64 grains; organic matter, silica, alkaline sulphates, etc., 32 grains.

Medical Lake.—Solid matter, 192 grains to the gallon; carbonate of soda and potassa, 120 grains; chloride of sodium and potassium, 48 grains; organic matter, silica, alkaline sulphates, etc., 24 grains.

Tall Sugar Cane.

The New Orleans *Times* has lately received from Ruatan three stalks of sugar cane measuring respectively 17 feet 9 inches, 16 feet, and 16 feet. The first had 57 joints, the other two 53 each.

© 1880 SCIENTIFIC AMERICAN, INC

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue. We publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

SUERTO PLATA, SAN DOMINGO, July 1, 1880.
H. W. Johns M'f'g Co., 87 Maiden Lane, New York:
I have ordered to-day through Messrs. R. H. Allen & Co., a lot of Roofing. Your Asbestos Roofing, which I have sold during the past three years, has given good satisfaction. Yours truly, W. O. BARTLETT.

Telephones repaired, parts of same for sale. Send stamp for circulars. P. O. Box 205, Jersey City, N. J.

The novel Shading Pen. Sample writing and circular free. See notice and cut this paper, May 1. A set of three sizes by mail, $1. Address J. W. Stoakes, Milan, O.

Metallic Pattern Letters, at reduced rates, manufactured by H. W. Knight, Seneca Falls, N. Y.

For Sale or Rent, at a merely nominal figure, the Camden and Amboy R. R. Shops, at Bordentown, N. J. For descriptive circular, address Board of Trade, Bordentown, N. J.

Partner Wanted, with Capital, to take half interest in a New and Valuable Invention which is now being tried by order of U.S.Government. Patent just allowed. Address G. W. Turner, Tremont House, 365 Broadway, N.Y.

For Sale.—Shapley & Welles Engine, 8 H.P.; as good as new. Lathe swing, 24 in. x 9 ft. T. & K., Box 246, Owego, Tioga Co., N. Y.

Penfield (Pulley) Blocks, Lockport, N.Y. See ad. p. 62.

Paper Board Manufacturing Companies will please send address to J. B. Parker, Memphis, Tenn.

Asbestos Board, Packing, Gaskets, Fibers, Asbestos Materials for Steam & Building Purposes. Boiler & Pipe Covering, Asbestos Pat. Fiber Co., limited, 194 B'way, N.Y.

Corrugated Wrought Iron for Tires on Traction Engines, etc. Sole m'f'rs., H. Lloyd, Son & Co., Pittsb'g, Pa.

Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited, Erie, Pa.

Apply to J. H. Blaisdell for all kinds of Wood and Iron working Machinery. 107 Liberty St., New York. Send for illustrated catalogue.

Our new Stylographic Pen (just patented), having the duplex interchangeable point section, is the very latest improvement. The Stylographic Pen Co., Room 13, 169 Broadway, N. Y.

Advertising of all kinds in all American Newspapers. Special lists free. Address E. N. Freshman & Bros., Cincinnati, O.

For Separators, Farm & Vertical Engines, see adv. p. 28.

Skinner & Wood, Erie, Pa., Portable and Stationary Engines, are full of orders, and withdraw their illustrated advertisement. Send for their new circulars.

Sweetland & Co., 126 Union St., New Haven, Conn., manufacture the Sweetland Combination Chuck.

Power, Foot, and Hand Presses for Metal Workers. Lowest prices. Peerless Punch & Shear Co., 52 Dey St., N.Y.

The Brown Automatic Cut-off Engine; unexcelled for workmanship, economy, and durability. Write for information. C. H. Brown & Co., Fitchburg, Mass.

For the best Stave, Barrel, Keg, and Hogshead Machinery, address H. A. Crossley, Cleveland, Ohio.

Best Oak Tanned Leather Belting. Wm. F. Forepaugh, Jr., & Bros. 531 Jefferson St., Philadelphia, Pa.

For Patent Shapers and Planers, see ills. adv. p. 28.

National Steel Tube Cleaner for boiler tubes. Adjustable, durable. Chalmers-Spence Co., 40 John St., N. Y.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Stave, Barrel, Keg, and Hogshead Machinery a specialty, by E. & B. Holmes, Buffalo, N. Y.

Pat. Steam Hoisting Mach'y. See illus. adv., p. 61.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Condit, Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Presses, Dies, and Tools for working Sheet Metal, etc. Fruit & other can tools. Bliss & Williams, B'klyn, N. Y.

Instruction in Steam and Mechanical Engineering. A thorough practical education, and a desirable situation as soon as competent, can be obtained at the National Institute of Steam Engineering, Bridgeport, Conn. For particulars, send for pamphlet.

Hydraulic Jacks, Presses and Pumps. Polishing and Buffing Machinery. Patent Punches, Shears, etc. E. Lyon & Co., 470 Grand St., New York.

Forsaith & Co., Manchester, N. H., & 207 Centre St., N. Y. Bolt Forging Machines, Power Hammers, Comb'd Hand Fire Eng. & Hose Carriages, New & 2d hand Machinery. Send stamp for illus. cat. State just what you want.

Air Compressors, Blowing Engines, Steam Pumping Machinery, Hydraulic Presses. Philadelphia Hydraulic Works, Philadelphia, Pa.

Wright's Patent Steam Engine, with automatic cut off. The best engine made. For prices, address William Wright, Manufacturer, Newburgh, N. Y.

Sheet Metal Presses. Ferracute Co., Bridgeton, N. J.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 28.

For Mill Mach'y & Mill Furnishing, see illus. adv. p. 29.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 381.

Rollstone Mac. Co.'s Wood Working Mach'y ad. p. 29.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Large knife work a specialty. Also manufacturers of Soloman's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N. J.

Don't buy until you see the $4 Drill Chuck; holds 0 to 9-16. A. F. Cushman, Hartford, Conn.

For Sale Cheap.—A Springfield Gas Machine, with 500 light capacity. D. L. E., 16 White St., New York.

Upright Engine, 16 x 28 in., in good order, and now running in this city, will be sold low. Belcher and Bagnall, 40 Cortlandt St., New York.

Wanted—First-class Iron Lathe, 20 to 24 in. swing, 17 to 20 ft. bed. Wm. Anderson, 23d and Wood St., Phila.

$325 Horizontal Engine, 20 H. P. See page 61.

Improved Solid Emery Wheels and Machinery, Automatic Knife Grinders, Portable Chuck Jaws. *Important*, that users should have prices of these first class goods. American Twist Drill Co., Meredithville, N. H.

For Standard Turbine, see last or next number.

Burgess' Non-conductor for Heated Surfaces; easily applied, efficient, and inexpensive. Applicable to plain or curved surfaces, pipes, elbows, and valves. See p. 284.

Fire Brick, Tile, and Clay Retorts, all shapes. Borgner & O'Brien, M'f'rs, 23d St., above Race, Phila., Pa.

Diamond Engineer, J. Dickinson, 64 Nassau St., N.Y.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

Wanted—The address of 40,000 Sawyers and Lumbermen for a copy of Emerson's Hand Book of Saws. New edition 1880. Over 100 illustrations and pages of valuable information. Emerson, Smith & Co., Beaver Falls, Pa.

The "Fitchburg" Automatic Cut-off Horizontal Engines. The "Haskins" Engines and Boilers. Send for pamphlet. Fitchburg Steam Engine Co., Fitchb'g, Mass.

For Wood-Working Machinery, see illus. adv. p. 62.

Eclipse Portable Engine. See illustrated adv., p. 62.

Elevators, Freight and Passenger, Shafting, Pulleys and Hangers. L. S. Graves & Son, Rochester, N. Y.

Tight and Slack Barrel machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv. p. 61.

For Alcott's Improved Turbine, see adv. p. 45.

Wheels and Pinions, heavy and light, remarkably strong and durable. Especially suited for sugar mills and similar work. Circulars on application. Pittsburg Steel Casting Company, Pittsburg, Pa.

C. J. Pitt & Co., Show Case Manufacturers, 226 Canal St., New York. Orders promptly attended to. Send for illustrated catalogue with prices.

4 to 40 H P. Steam Engines. See adv. p. 63.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

Elevators.—Stokes & Parrish, Phila., Pa. See p. 61.

NEW BOOKS AND PUBLICATIONS.

AN ELEMENTARY TEXT BOOK OF BOTANY. From the German of Dr. K. Prantl. Revised by S. H. Vines, M.A., D.Sc., F.L.S. Illustrated. Philadelphia: J. B. Lippincott & Co.

Professor Prantl bases his text book on the voluminous "Lehrbuch" of Professor Sachs. The English editor of the translation has adopted the general classification of thallophytes proposed by Professor Sachs in the fourth edition of his work, and has rearranged the various families of the group to correspond. Otherwise Professor Prantl's text has been for the most part closely followed.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) P. C. C. asks: What will remove stains from silk caused by new rich milk? The fabric was dyed an indigo blue; the original color was ashes of rose (a species of drab). Have tried lustral spirits, which is a distilled benzine preparation, also chloroform, ether, alcohol and ammonia, detersive soap, etc. A part of the spot is removed, apparently the oleaginous, but a stain remains. A. Rub well into the spots purified ox gall, mixed with an equal volume of soft water and a small quantity of fuller's earth; wash out with soft water, press between sheets of filtering paper with a hot iron, and brush. If the color has been discharged the judicious application of a little aniline blue or indigo extract dissolved in water will revive the parts.

(2) F. S. B. writes: I desire to know the proper acid mixture by which I can etch names upon steel, by melting a thin layer of beeswax upon the steel, then writing the name, and then putting on the acid. A. The etching fluid may consist of: 1. Nitric and acetic acid, each 1 part, water 3 parts. 2. Sulphate of copper, alum, and salt, equal parts, moistened with vinegar. 3. A strong solution of pyrogallic acid in water. The first is more active. Better use as a ground a mixture of equal parts asphaltum, Burgundy pitch, and beeswax. Melt together, pour into water, press out, and wrap in two thicknesses of silk. Rub this over the warm steel plate or surface.

(3) J. A. writes: In looking over my paper this evening (SCIENTIFIC AMERICAN, May 29th), I noticed vats for nickel plating. Thinking there was nitric or other acids used for plating, and as they appeared to be made with wood, I thought I might get some information that would help me out of what we find a great difficulty. We require a nitric acid bath 34 inches long, 30 inches high, 27 wide, for striping silk ribbons, etc., for redyeing. Of course the acid is diluted, say ¾ water to ¼ acid. C they be made with wood to last any time? If so, what wood is best, or is there any thing better? A. Vessels of stoneware, glass, or porcelain-enameled iron are used for this purpose. Wood will not answer.

(4) W. H. I., referring to an article by Mr. Chase in No. 219, SUPPLEMENT, on building a canoe, asks whether it is to have a keel project from the bottom or is to be smooth. If smooth, should there not be a notch cut in the bottom of the pieces for bulkheads to admit keelson? A. There is to be no keel; the bulkheads to be jogged on keelson.

(5) L. J. O. writes: 1. I am making a telephone transmitter as described in your issue of May 8, 1880. I am desirous of having my battery at one end of the line, instead of one at each end, as one end will be exposed to frost in winter. Could you show me how the connections should be made? I can put up several wires if required. A. The battery should in all cases be near the transmitter. You should use some form of battery that will not freeze, or protect the battery in some way from the frost. 2. Is the carbon used in electric lighting by incandescence the same as is used in the ordinary electric light? A. Yes, but the pencil is usually much smaller in diameter.

(6) R. R. W. writes: Suppose a vessel is placed in a rain storm when the rain is falling exactly perpendicular; now, if the same vessel is placed in a storm when the rain is falling slanting, that is, at an angle, will the vessel contain the same amount of water each time, everything being equal? A. The vessel would receive less water when the rain falls at an angle, all other things being equal. Supposing the column of rain drops entering the vessel to be circular, the angular direction of the rain would give an elliptical section to the column which would be larger than the top of the vessel, and as a consequence some of the rain would fall outside the vessel.

(7) R. P. J. asks: What will drive away house ants? I have some at my house and they are very troublesome, and I have tried various things, but with no success. A. Dalmatian insect powder. Powdered borax with a little sugar. Blow into the cracks and crevices with a small bellows.

(8) B. F. V. writes: 1. I have a boat hull, extreme length 25 feet 7 inches; width, 5 feet 3 inches; depth at prow 3 feet, at stern 2 feet 3 inches, outside measure; the sides are 2 inches thick. It is made of well seasoned cotton wood, ⅞ inch thick, sawed to shape, not bent; then the pieces were well matched and nailed down, piece upon piece, with eightpenny nails, the nails about six inches apart. Thus the hull is built up of layers of strips, 7-8x2 inches without rubbing, etc., on the inside of the hull. The weight of hull is appropriately about 1,000 lb. Her prow is long and tapers well. The keel tapers away from the prow to about midway aft, where the bottom becomes flat. How much canvas will she safely carry, and what style of rigging is best suited for inland waters, taking into account appearance and ease of handling? A. We can give no opinion about the amount of sail that can be carried, not knowing the model. We should say a jib and a shoulder of mutton sail, mast say 20 to 22 feet in length. You will probably have to carry ballast and add to the keel. 2. If steam were used, what power would be required to make about ten miles an hour? Would one horse power do? A. Neither one horse nor four horse will do it. 3. What size, pitch, and revolution of screw? A. A screw could not be used with success on account of the light draught of water.

(9) A. K. D. asks whether the pressure in a steam boiler is greater under the water than it is above the water? If so, why? A. It is. To get the pressure on the bottom, add to the steam pressure one pound for every twenty-six inches depth of water.

(10) J. N. S. writes: I want to get a cylinder large enough to force in with force pump 6,000 cubic feet of coal gas. How large a cylinder will it require, and at what pressure to the square inch? Please give size of cylinder in diameter and length, also the pressure to the square inch. A. If the 6,000 feet gas, approximately, be at the pressure of the atmosphere, and it is forced into a cylindrical receiver 43 inches diameter by 10 feet in length, the pressure will be 295 lb. per square inch, providing the temperature of the gas remains unchanged at the end of the process.

(11) I. S. asks: What will set the colors in cotton goods before washing? It is said turpentine will set blue, but how much? and what will set reds, green, and yellows, and how if two of these colors are in the same piece? Even the browns wash out. A. The attempt to render such colors on finished goods fast is likely to prove unsatisfactory and unprofitable. In washing such goods a little salt may be advantageously added to the waters, which should be soft and not too hot, and the cloth should not be allowed to remain longer in the water than is absolutely necessary.

(12) M. H. D. asks: What will remove printer's ink from linen or paper? A. Plenty of naphtha or benzole, strong, hot, caustic soda, or potash solution (in water).

(13) J. H. C. asks if a canoe, 13 feet long, 24 inches wide, and 18 inches deep, could be run by a hand pump, sucking the water in at one end, and sending it out the other, through a nozzle, made so as to form the rudder. If so, what kind of a pump? A. No; a pump would move the boat, but with much less rapidity than with the same power applied to oars.

(14) G. J. L. asks: 1. Which of the primary mechanical powers is illustrated in the action of a spring, a clock for example? A. Neither. It operates by its elasticity and is merely a reservoir of power. 2. What is the use of the bar magnet in the telephone, described in SUPPLEMENT, No. 142 (Fig. 4), as I can see no connection between it and any other part? A. The diaphragm of the telephone is always attracted by the magnet, but the force of this attraction is varied by the electrical impulses in the helix which surrounds the magnet. The electrical impulses are generated by the vibration of the diaphragm in front of the magnet of another similar instrument. This changes the force of the magnet and induces currents in the helix surrounding the magnet. These currents, being conveyed to the helix of the receiving instrument, vibrate the diaphragm and reproduce the sounds which vibrated the diaphragm of the transmitting instrument.

(15) S. M. R. asks (1) how to melt brass in an ordinary fire. A. Place it in a sand crucible with a little borax. A coal fire with a good draught will melt it. Place the crucible well down in the fire. 2. How to anneal brass to make it hard or soft. A. To make brass soft heat it to a low red and plunge in water. It cannot be hardened except by rolling or hammering.

(16) J. V. asks how to make bisulphite of lime in a simple way, in small quantities, say ten gallons or so. A. Pass sulphurous acid (gas), derived from burning sulphur, through granular dry slaked lime until the lime will absorb no more. Keep the lime cool.

(17) W. M. S. writes: Can you give me the ingredients and proportions for making a soft solder that will melt quickly at a low temperature, over an ordinary candle or lamp, and to be used for mending tinware? A. Pure lead and tin 1 part each.

(18) F. A. T. asks: How can I restore to their natural color a half dozen ink-stained shirts? A. Most ink stains are readily removed by the application alternately of strong aqueous solutions of oxalic acid and chloride of lime (calcium hypochlorite). Rinse well with water before soaping.

(19) H. J. L. writes: Will you please inform me of the best and also quickest method of dissolving and precipitating pure gold a hundred ounces at a time, also the proportions to be used of chemicals? A. Gold is dissolved by a warm mixture of 3 parts muriatic and 1 part nitric acids. Boil down gold solution when complete, nearly to dryness, dilute with 4 or 5 volumes of water, filter, and add strong solution of sulphate of iron (copperas) until no further precipitate forms. The dark precipitate is finely divided metallic gold. Settle, decant, or filter, and wash with clean water.

(20) D. H. asks for information about artificial wood. What are its component parts? Whether it can be moulded, etc.? A. One preparation so-called consists of a mixture of sawdust and paper pulp moistened with glue water and subjected to hydraulic pressure.

(21) T. J. T. asks how to make a jet black varnish for small wood handles, that will make them smooth and shining, and that will make them hard and solid, so that they will not get dim by handling, or lose their gloss. A. The varnish consists of: Asphaltum, 3 oz.; boiled oil, 4 quarts; burnt umber, 8 oz.; and enough oil of turpentine to thin. The three first must be mixed by aid of heat and the turpentine gradually added (out of doors and away from fire) before the mixture has cooled. The work (dry) is given several coats, each being hardened in a japanner's oven. The last coat may be rubbed down, first with tripoli (applied on a soft cloth), then with a few drops of oil.

(22) W. H. T. asks: 1. What is the net percentage of gain from the use of the live steam jacket on steam engine cylinders? If there is no recorded experiments that will show it clearly, give your opinion as to its approximate value. A. There have been many experiments to determine the gain, and with very differing results. Under ordinary conditions it is probably not more than 5 per cent, often less. 2. Is the white oxide on zinc sheets poisonous? A. Yes. 3. Is any noxious gas given off during its formation? A. No.

(23) J. H. writes: We have a large lot of white bone tufting buttons, and on account of the color are no use to us. Can you tell me how we can color them a permanent black, or a good deep brown? A. Boil them in a strong aqueous decoction of logwood or logwood extract, then in solution of sulphate or persulphate or acetate of iron. 2. We also have a lot of beeswax, but entirely too black and dirty for our use in the business. How can we make it more clear so as to be useful? A light yellowish brown would do. A. Wax, 1 lb.; chloride of lime, 2 oz.; water, 1 pint. Heat the wax to about 212° Fah., and agitate with it the water and bleaching powder until the wax is whitened. Then agitate with a quantity of water containing about 5 per cent of sulphuric acid. Wash in boiling water, draw off and melt. Use lead lined vessels.

(24) M. A. D. asks: Will pumping the air out of an air tight vessel partially filled with water cause the water to freeze or turn cold? Would putting any kind of chemicals in another larger vessel around the air tight vessel help to turn it cold? If so, what kind of chemicals? What vacuum would have to be arrived at to freeze or turn very cold? A. Small quantities of water may be frozen in this way, provided the pumps are capable of maintaining a good overcurrent (say of 750 mm.); suitable provision made for the rapid absorption of the aqueous vapor given off by the water and the vessel containing the water to be frozen is properly sheathed during the operation in non-conducting material. The absorbent for the vapors used may be strong sulphuric acid placed in a large vessel immediately adjoining the one containiug the water and intermediate between it and the pumps. Small machines on this principle, made by Carre, of Paris, are in use. See "Ice and Ice Machinery," Knight's New Mechanical Dictionary.

(25) R. M. writes: 1. In making brine for curing beef tongues it is customary to use, besides the salt and water, a little molasses and saltpeter. Now, can you tell me why the molasses and saltpeter are used? All market men know that it is the proper thing to do, but I cannot find one who can explain their action on the tongues. A. Sugar (or molasses) is a powerful antiseptic, and in connection with salt preserves the flavor of the meat better than salt alone. Niter in the brine keeps the meat red and of a healthy color. 2. What liquid produces the greatest degree of cold in evaporating? A. That which evaporates most rapidly. Liquefied hydrogen stands at the head of the list.

(26) J. E. H. asks: 1. What is the best lacquer or varnish to apply to the bright parts of a bicycle to prevent their rusting and still have them look bright? A. Use a thin, clear alcoholic solution of bleached shellac. 2. Should the grease be removed before putting on the varnish? A. Yes.

© 1880 SCIENTIFIC AMERICAN, INC

(27) R. H. S. asks: 1. How can I dissolve common beeswax so as to mix with hot water? A. Wax is soluble in oil of turpentine, benzole, etc. An emulsion may be obtained by violently agitating these solutions with hot water. Wax cannot be made soluble in water. 2. What book is the best to get on training and athletics? A. See our advertising columns for the names of book dealers whom you should address.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

W. E. H.—1 and 4. Quartzose rock, probably auriferous. 2. Galena carries a little silver. 3. Iron pyrites.—O. M S., R. C., M T. H. W., and H. S.—Your minerals have not yet come to hand.—J. J. T.—Limestone containing iron pyrites of no value.—J. A. T.—It is celestite—strontium sulphate.—S. T.—1. An impure fluorspar. 2. Gypsum—lime sulphate.—A. L. B.—It is beryl —$3BeO,Al_2O_3,4SiO_3$.—E. B. B.—Biotite (hexagonal mica).—G. S. McC.—1. Calcite—lime carbonate. 2. Dolomite—magnesian limestone.—3. Mica schist. 4. Zinc blende—sulphide of zinc and iron.—S. W. W.—1. Not corundum but magnetite—a valuable iron ore. 2. Impure pyrolusite—oxide of manganese.—A. St. J., Jr. —Galena (lead sulphide) with chalcopyrite in quartzose; probably carries a small quantity of silver. We have several samples of minerals, etc., bearing no mark by which we can identify their senders.

COMMUNICATIONS RECEIVED.

On Conservation of Energy. By H. S. B.
The Bell Telephone Considered as an Induction Coil.
The Chemistry of Electricity. By W. H. G.
On Experiments in Magnetism. By E. P. T.
On Caving in of Mines. By D. E. H.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

June 29, 1880,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

Aging liquors, J. M. Morrison 229,269
Air compressor, H. Richmann 229,468
Air medicating apparatus, H. R. Fowler 229,393
Air purifying apparatus, F. A. Bruns 229,374
Amalgamator, A. V. Trust 229,498
Artist's board, E. F. French 229,244
Axle, carriage, F. D. Bliss 229,364
Baby carrier, H. Behr 229,233
Bag for packing and storing, J. H. Preater 229,333
Baking device, W. H. Henderson 229,314
Bale tie, wire, L. E. Evans 229,392
Barrel swing, J. Cummins 229,306
Beach seat, G. H. Chatterton 229,378
Bed, camp, T. J. Joslin 229,421
Bed rest, invalid, J. V. R. Towers 229,286
Bed, spring, O. S. Foster 229,243
Bedstead, invalid, L. Prince 229,460
Beehive, W. S. Blaisdell 229,362
Belt fastening, A. Schuhknecht 229,278
Belt for harvesters, etc., elevator, G. H. Raymond 229,275
Bolts, holder for galvanizing, W. P. Breeding 229,366
Boring, sawing, grinding, and rabbeting machine, combined, H. Boerstler 229,294
Bosom board, A. P. Ryan 229,475
Bracelet, C. P. Bishop 229,360
Bracelet, Riley & Freer 229,276
Bretzels previous to baking, apparatus and process for preparing, W. Lampert 229,320
Brick machine, W. L. Gregg 229,247
Bridle, H. Hartman 229,405
Brush making machinery, C. A. Watkins 229,289
Bucket, dinner, G. K. Shryock 229,480
Bullets, paper patch or case for, H. W. Mason 229,327
Button and stud, F. P. Barney 229,356
Button and stud, P. Laroussle 229,428
Button or stud, E. Dobell 229,240
Button, separable, E. S. Dodge 229,388
Buttons from plastic material, manufacture of, P. L. Sylvester ..... 229,490 to 229,494
Cans, swinging, F. C. Wilson 229,293
Car brake, Wohlfarth & Wakefield 229,510
Car coupling, R. B. Eubank, Jr 229,241
Car coupling, J. F. Gross 229,400
Car coupling, Hathaway & Myers 229,408
Car coupling, A. G. Hohenstein 229,411
Car coupling, H. C. Wofford 229,511
Car door, grain, W. A. McClintock 228,440
Cars, lever for moving, O. B. Blakeslee 229,363
Carbureter, G. Westinghouse, Jr 229,346
Carpet sweeper, W. J. Drew 229,389
Carpet tacker, S. S. Grannis 229,397
Carriage top joint, N. L. Fox 229,312
Cartridge loading implement, J. H. Barlow 229,301
Caster, furniture, C. T. Schoen 229,478
Casting metal, J. Duff 229,308
Casting printing rolls for graining woodenware, manufacture of patterns for, D. H. Wilder 229,508
Celluloid and other plastic compositions or substances, machine for grinding and mixing, J. Schmerber *et al* 229,477
Check rower, S. R. Allee 229,350
Churn dasher, J. M. Teasdale 229,496
Churn power gearing, J. H. & E. R. Elmer 229,391
Cloth finishing machine, D. C. Sumner (r) 9,265
Cloth, instrument for turning edges of, A. Y. Moorefield 229,447
Coal box and fire iron holder, A. F. Tripp (r) 9,267
Coffee pots, etc., manufacture of, G. H. Simmons. 229,482
Colter, J. Clayton 229,381
Copy holder, J. S. B. Patterson 229,453
Cooking vessel, J. R. Noble 229,450
Cot, folding, B. Van Dyke 229,501
Crochet needle, E. P. Haff 229,402
Cuff supporter, F. W. Libby 229,324
Cultivator, cotton, R. A. Johnson 229,318
Dentist's and barber's chair, A. Abel 229,227
Diagram sheet, perspective, E. M. Hamilton 229,404
Dish washer, B. J. Howe 229,413
Door, tilting, G. Wagner 229,502
Dwelling house, T. Hurley 229,416
Egg beater, T. W. Brown 229,372
Elbow joint, J. W. Orphy 229,331
Electric lights, carbon for, Sawyer & Man 229,335
Electric switch, Sawyer & Man 229,476
Electric switch board, T. A. Watson 229,345
Elevator bucket, A. Charles 229,235
Fabric, D. C. Sumner (r) 9,266
Fan, H. Birckenstadt 229,361
Fan, F. O. Horstmann 229,415
Fan, fly, S. G. Stoddard 229,337
Faucet, automatic, T. H. Walker 229,503
Feather renovator, O. C. Monroe 229,268
Fence, H. Hill 229,315
Fence brace, J. M. Fleming 229,311
Fence post and gate hinge, combined, J. Cunningham 229,385
Fertilizer dropper, D. B. T. Walton 229,504
Fibers, treating pine leaves and other vegetable, G. J. Gregerson 229,248
Filter, reversible, J. A. Crocker 229,384
Firearm, breech-loading, D. M. Lefever 229,429
Firearm sight, F. W. & G. Freund 229,245
Fire extinguisher, C. T Holloway (r) 9,271
Fish, preservation of salted cod, P. H. Brink 229,368
Fruit and lard press, E. D. Greer 229,398
Fruit crusher, J. Lamont 229,425
Furnace grate, steam boiler, J. L. I. Knox 229,319
Gas burner, H. W. Merritt 229,444
Gas generator for hydrocarbon furnaces, A. E. Watkins 229,344
Gas, process and apparatus for manufacturing hydrogen, C. M. T. Du Motay 229,339
Gas, process and apparatus for producing hydrogen, C. M. T. Du Motay 229,338
Gas, production of hydrogen, C. T. Du Motay 229,340
Gas regulating burner, G. J. Hickey 229,409
Gate, Hollinger & Flinner 229,412
Gilding process, Laurense & Matzka 229,427
Glass cutter, revolving, B. F. Adams 229,228
Glass plate cleaner, C. F. Linscott 229,430
Glove, J. M. Chanut 229,377
Grain, and simultaneously purifying the products thereof, mode of and apparatus for reducing, G. Milbank 229,445
Grain binder, A. Goodyear 229,396
Grinding machine, H. Hammond 229,250
Grub and stump puller, J. J. Marshall 229,437
Gun lock, W. N. Crabtree 227,383
Handle for satchels, bags, etc., E. Simon 229,481
Harness hook, J. B. & M. J. Witter 229,348
Harrow, M. M. McDirmit 229,265
Harrow, rotary, H. H. Monroe 229,267
Harrow, rotary and drag, P. R. Weatherford 229,505
Harvester, H. A. Adams (r) 9,263
Harvester rake, P. Thompson 229,284
Harvester sickle bar, J. D. James 229,417
Hat, ventilating, R. Ray 229,464, 229,466
Hatch closer, automatic, S. E. Stokes 229,486
Hay loader, Richards & Brandenburg 229,469
Hay rake, horse, W. Adriance 229,349
Hay ricking and loading device, J. E. Kirk 229,424
Heel trimming machine, J. Langlois 229,426
Horse power for gins, etc., W. H. Harvey 229,407
Hub attaching device, W. Baker 229,353
Ink well, J. C. Latsbaugh 229,260
Insect destroying apparatus, W. H. Anderson 229,230
Insect destroying apparatus, L. T. Jones 229,317
Knitting machine, O. Twombly 229,288
Knitting machine for manufacturing fabrics for mattresses, etc., M. Townsend 229,487
Lacing hook, sheet metal, C. I. Humphreys 229,253
Ladder, extension, C. P. Rood 229,472
Lamp, electric, Fuller & Mackintosh 229,246
Lamp, miner's, J. A. Anton 229,351
Lantern, J. W. Orphy 229,330, 229,452
Latch, S. H. Wheeler 229,347
Lifting jack, F. S. Hartzell 229,406
Lightning rod, J. J. Cole 229,382
Liquid cooler for cooling liquids under pressure, E. Bigelow (r) ..... 9,272 to 9,274
Locomotive chair, O. Unzicker 229,500
Loom, J. C. Duckworth (r) 9,270
Loom shuttle operating mechanism, F. H. Davis. 229,238
Magneto-electric machines, commutator for, N. S. Keith 229,255
Mail bag, Bennett & Trenbath 229,358
Marking and slitting gauge, C. Kinney 229,258
Measure, wooden, J. Armanet 229,231
Measures, adjustable gauge for liquid, T. F. Longater 229,431
Meat, etc., fabric for packing, F. Rohe 229,471
Mechanical movement, J. E. Underwood 229,295
Milk cooler, A. R. Brown 229,373
Milk cooler, W. E. Lincoln 229,262
Milk cooling apparatus, E. A. Roth 229,474
Music chart, J. W. Chambers 229,379
Music leaf turner, A. Heilprin 229,313
Music stand, J. W. Pepper 229,271
Musical instruments, marking the keys of key boards for, J. B. D. Black 229,365
Nailing machine, G. McKay 229,412
Necktie, J. H. Reynolds 229,334
Necklace fastening, L. L. King 229,257
Nickel depositing solution, J. Powell 228,274
Oils to buildings, apparatus for supplying hydrocarbon, J. S. Hull 229,316
Open hearth furnace, W. L. McNair 229,443
Ore concentrating pan, E. W. Lyon 229,263
Ore crusher and pulverizer, J. T. Davis 229,387
Ore washer, S. P. Speers 229,281
Ores, desulphurizing, H. F. Williams 229,509
Organ, reed, J. C. Briggs 229,369
Organ valves, spring for, J. C. Briggs 229,370
Padlock, C. Pease 229,332
Paint composition, G. Rossi 229,473
Paper, converting straw into bleached, J. Kauffmann 229,254
Paper folding machine, G. E. Jones 229,419
Paper hanger's table, W. Trilk 229,497
Paper, etc., machine for folding and cutting, G. E. Jones 229,420
Paper pulp, preparing wood for making, J. Davy, Jr. 229,307
Paper tubes, machinery for making, M. Young 229,296
Parer, apple, H. H. & I. A. Hebbard 229,251
Pattern plates, making, G. Woolnough 229,294
Pen, fountain, A. T. Cross 229,305
Pen, stylographic fountain, F. J. Seybold 229,336
Pencil sharpener, F. M. Livingston 229,323
Petroleum, etc., refining, J. H. Alexander 229,297
Photo-negative plates, apparatus for retouching, K. T. Pihlgren 229,272
Piano and organ indicator, D. D. Tracy 229,287
Pile driver, J. W. Putnam 229,461, 229,462
Plaiting machine, G. W. Kendall 229,423
Planter, corn, J. K. Voorhees 229,343
Planter, hand corn, C. B. Arnold 229,300
Planters, fertilizer distributer attachment for, A. N. Gabel, Sr 229,394
Plicating fabrics, machine for, J. J. Scholfield 229,479
Plow, J. L. Brinley 229,367
Plow, G. A. De Long 229,239
Plow, Z. R. Percefull 229,455
Plow, D. Stanchfield 229,484
Plow carriage, sulky, L. Cahill 229,375
Potassium sulphate from kainit, manufacture of, C. N. Hake 229,249
Precious stones, paste, or composition of glass, real or imitation, F. E. Meyer 229,328
Printing machine inking fountain, J. X. Browne. 229,303
Printing press reversing mechanism, C. Potter, Jr. 229,273
Printing surfaces, producing plate, P. H. Mandel 229,435
Propeller, screw, L. Perkins 229,270
Pump rod adjuster for oil wells, H. Balliet 229,354
Railway rail, F. Hoffmann 229,410
Railway signal, electric, Leblanc & Loiseau 229,321
Railway signal, electric, C. D. Tisdale 229,285
Railway tracks, apparatus for laying, T. Adams 229,229
Razor strop, J. R. Torrey 229,342
Refrigerator, C. H. Saybolt 229,277
Rendering fat, apparatus for, Miller & Gross 229,446
Rivet or eyelet setting machine, Platt & Bradley. 229,459
Rock drill, L. B. Stone 229,485
Rowlock, M. F. Davis (r) 9,269
Sash fastening, C. H. Nye 229,451
Saw, drag, M. B. Swindell 229,488
Seeding machine, J. L. McCall 229,439
Sewing machine, broom, C. E. Lipe 229,322
Shank making machine, E. M. Marston 229,438
Sheet metal strips, die for edging, E. E. Johnson. 229,418
Shell, explosive, G. W. Turner 229,499
Shingle sawing machine, E. D. Greer 229,399
Shipping can, T. K. Webster 229,507
Shirts, connecting neck bands, yokes, and cuffs to, C. Barns 229,232
Shoe, J. A. Weaver 229,290
Shoe box indicator, L. D. Cooley 229,236
Shoe nail, E. S. Caswell 229,376
Shoe nails, making, H. F. Whidden 229,292
Sifter, ash, E. M. Brewster 229,371
Skirt supporter, Smith & Nall 229,483
Snow from railways, apparatus for removing, D. M. McMaster 229,266
Soda from spent liquors after treating vegetable fiber, recovering, Markle & Jordan 229,264
Soda water, etc., draught tube for drawing, W. P. Clark 229,304
Speed indicator and recorder, F. Petri 229,456
Spinners' staples, cleaning and opening, S. D. Keene 229,256
Square, try, L. S. Starrett 229,283
Stamp, canceling, G. D. Spooner 229,282
Steam boiler, G. H. Babcock *et al* 229,352
Steam machinery lubricator, G. H. Flower 229,242
Stereotype plate holder, F. Wesel 229,291
Stocking, H. J. Griswold 229,401
Stove pipe joint fastener, H. M. Wells 229,506
Stoves, vapor burner for, D. E. Bangs 229,355
Street sweeper, W. B. Dunning 229,390
Sun shade, laborer's, R. Ray 229,465
Swing, W. F. Phillips 228,457
Tape, etc., holder, E. P. Haff 229,403
Tea kettle, W. S. Withers 229,512
Telegraph conductors, underground conduit for, R. B. Lamb 229,259
Telegraph relay, G. M. Hopkins 229,414
Telephone call register, C. J. Bell 229,302
Telephone call register, S. Tainter 229,495
Telephone circuit switch, Anders & Watson 229,299
Telephone lines, signal box for, See & Gray 229,279
Telephone systems, individual signaling apparatus for district, Anders & Watson 229,298
Telephone, transmitting, L. W. Sutton, Jr 229,489
Thill coupling, J. A. Fairbanks 229,310
Thill coupling, D. T. Robinson 229,470
Thill support, J. A. Beamisderfer 229,357
Tobacco, process and machine for drying, Lottier & Perrigo 229,434
Tray, C. Remhof 229,467
Trimming or edging, pointed, J. H. Emmerich 229,309
Truck, hand, M. Johnson 229,422
Type writers, finger guide for, A. M. Da Costa 229,386
Type writing machine, J. H. Phipps 229,458
Umbrella support, J. H. Gordon 229,395
Urinal mat, E. J. Mallett, Jr 229,436
Valve, balanced puppet, Tilden & Guerber 229,341
Vapor burner, W. R. Park 229,454
Vehicle running gear, A. H. Crawford 229,237
Vehicle running gear, C. M. Murch 229,329
Vehicle spring, E. C. Lefferts 229,261
Velocipede, railway, E. K. Hill *et al* 228,252
Vise, N. E. Lovejoy 229,432
Waffle iron, Selden & Griswold, Jr 229,280
Wagon jack, J. Charles 229,380
Washing machine, W. H. Long 229,433
Washing machine, S. C. McCullough 229,441
Water closet bowls, flushing device for, T. Maddock 229,326
Wells, tool for extracting tubular casings from oil, J. H. Luther 229,325
Whiffletree, safety, B. J. Quattlebaum 228,463
Wire stretcher, G. Nicholson 229,449
Wrench, J. C. Beeks 229,359
Zinc or white lead fumer, separating and condensing, S. Murrell 229,448

DESIGNS.

Carpet, H. Horan 11,831
Carpet, H. Nordmann 11,832, 11,833
Carpet, G. W. Piggott 11,834
Picture or mirror frame, J. R. Ritchie 11,835
Types, font of printing, J. Herriet 11,830
Types, font of printing, H. Ihlenburg 11,836, 11,837

TRADE MARKS.

Cigars, Straiton & Storm 7,952
Medicinal preparations, H. A. Cassebeer, Jr 7,953
Organs, pianos, and melodeons, G. P. Bent 7,958
Tobacco, chewing and smoking, Cullingworth & Ellison 7,957
Tobacco, smoking, Wellman & Dwire 7,955, 7,956
Yeast, compressed, G. K. Anderson 7,954

English Patents Issued to Americans.

From June 25t o June 29, 1880, inclusive.

Ball castors, L. A. Aspinwall, Albany, N. Y.
Button, T. L. Snyder, Montclair, N. J.
Button, E. Shrier. San Francisco, Cal.
Berth for ships, J. C. Thompson, Roslyn, N. Y.
Corsets, M. K. Bortree, Jackson, Mich.
Coupling link for railway cars, A. Middleton, Phila., Pa.
India-rubber, manuf. of, H. Gerner, New York city.
Liquor, aging, A. L. Wood, Boston, Mass.
Screw machinery, W. H. Eddy, Mass.
Turning lathe, J. Hill, Columbus, Ga.
Wheat polishing machinery, D. M. Richardson, Detroit, Mich.

Advertisements.

Inside Page, each insertion - - - 75 cents a line.
Back Page, each insertion - - - $1.00 a line.
(About eight words to a line.)
Engravings may heaa advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

☞ The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

The Magical Organette only $8.

A Marvel of Musical Invention, and the Most Perfect Self-Acting Musical Wonder made. *Its Reeds are Double Size. Magical Organette and 16 feet of Music*, only $8.00. Extra Music, *which will fit any Organette*, about 6 cts. per foot. Circulars and set of Beautiful Fancy Cards for 3 cent stamp.
THEO. J. HARBACH, 809 FILBERT ST., PHILA., PA.

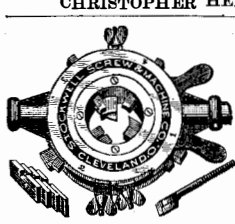
THE UNDERSIGNED WILL OFFER, AT public sale, on the premises, 197 to 219 Main St., Allegheny, Pa., Monday, 16th August, 1880, at 10 o'clock, A. M., the following:
The Patterns, Stock, Materials and Tools, Fixtures, Lease, and Good Will of the business of the Crawford Manufacturing Co., manufacturers of Saddlery Hard ware and Malleable Iron Castings.
These works are well adapted for the business, and the firm have been and are in control of a good trade.
To Capitalists or those desiring to engage in this business, this offers an excellent opportunity.
For further information, call on or address
W. JARVIS or W. McCONWAY, Receivers, Pittsburg, Pa.

COE BRASS MFG. CO. WOLCOTTVILLE CONN. BRASS AND COPPER IN SHEETS. MATERIALS FOR METALLIC AMMUNITION A SPECIALTY. WIRE AND BLANKS

INK COMPOUND, FOR USE IN STOAKES' AUTOmatic Shading Pens. Sent by mail. Twenty-five cent packages. Address B. W. CHILD, 64 Federal St., Boston.

RAMSDEN & CO., MAKERS AND IMporters of Astronomical Telescopes, 3 inches to 3 feet in diameter. Reasonable prices. Finest qualities refractors or reflectors. 610 Arch St., Philadelphia, Pa.

NOTICE TO WAGON MANUFACTURERS.
The power of attorney given by me to W. W. Carry for the sale of rights on my patent adjustable brake shoe clamp, granted Sept. 11, 1878, is this day revoked. All persons wishing to purchase rights on same must apply to the patentee,
CHRISTOPHER HEINEN, Ft. Laramie, W. T.



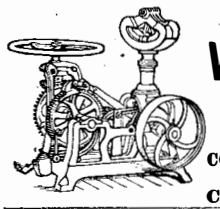
Magic Plate for Pipe.

NO.			
1	threads	and cuts off	⅛ to ¾
2	"	" "	¼ to 1¼
3	"	" "	½ to 2
4	"	" "	1½ to 3
5	"	" "	2½ to 4
Size A	threads	bolts	¼ to ¾
Size B	"	"	¼ to 1

The Stockwell Screw and Machine Co.,
CLEVELAND, · OHIO.

REVOLVING LEVEL.
A new invention, for the surveyor, mechanic, and farmer. Patent obtained for the United States for the term of seventeen years. Right for sale for any desired territory. For particulars, address
B. N. BOTTS, San Francisco, California.

FOR SALE.
A second-hand seventy-five H. P. Engine, 16 x 36 in. Cylinder, Corliss Frame, Slide Valve, Band Wheel 14 ft. diameter, 24 in. face, 7½ in. Wrought Iron Crank Shaft, Gardner Governor, in first-rate order. Price $1,200. Also all the machinery used in manufacturing the Celebrated Trade Wagon for sale at half cost.
S. N. BROWN & CO., Dayton, O.



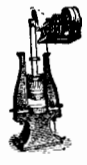
SNOW'S BEST Water Wheel Governor,
MANUFACTURED BY
COHOES IRON FOUNDRY AND MACHINE CO.,
COHOES, - - N. Y.

PERFECT
NEWSPAPER FILE

The Koch Patent File, for preserving newspapers, magazines, and pamphlets has been recently improved and price reduced. Subscribers to the SCIENTIFIC AMERICAN and SCIENTIFIC AMERICAN SUPPLEMENT can be supplied for the low price of $1.50 by mail, or $1.25 at the office of this paper. Heavy board sides; inscription "SCIENTIFIC AMERICAN," in gilt. Necessary for every one who wishes to preserve the paper.
Address
MUNN & CO.,
Publishers SCIENTIFIC AMERICAN

BEECHER & PECK,
Successors of MILO PECK, Manufacturers of
PECK'S PATENT DROP PRESS,

Regular sizes Hammer from 50 to 2,570 lb. Special attention given to making of Drop Dies, Drop and Machine Forgings.
New Haven, Conn.



NEW, HEAVY 50 H. P. ENGINE, BEST MAKE, FOR sale cheap. Address H. B. A. KEISER, 111 No. Broad St., Phila., Pa.

SCIENTIFIC AMERICAN SUPPLEMENT.
Any desired back number of the SCIENTIFIC AMERICAN SUPPLEMENT can be had at this office for 10 cents. May also be had or ordered through booksellers and newsdealers everywhere. MUNN & CO., Publishers, 37 Park Row, New York.

CARY & MOEN STEEL WIRE OF EVERY DESCRIPTION & STEEL SPRINGS. 234 W. 29. ST. NEW YORK CITY

TELEPHONE Works 1 mile. Price $4. Pat'd. Circulars free. HOLCOMB & CO., Mallet Creek, Ohio.

$20 COMFORT FOR $2.
Our Reader's Cot Chair, just out, combines, as never before, comfort, safety, strength, compactness, and cheapness. Beware imitations, liable to accidental closing and injury to sitters. Upright, easy, or reclining chair, cot, or stretcher in one. $2.00 to $5.00.
READERS & WRITERS ECONOMY CO.,
27 Franklin St., Boston; 4 Bond St., New York;
69 State St., Chicago.

© 1880 SCIENTIFIC AMERICAN, INC

STEAM PUMPS.

HENRY R. WORTHINGTON,

239 Broadway, N. Y. 83 Water St., Boston. 709 Market St., St. Louis, Mo.

THE WORTHINGTON PUMPING ENGINES FOR WATER WORKS—Compound, Condensing or Non-Condensing. Used in over 100 Water-Works Stations.

WORTHINGTON STEAM PUMPS of all sizes and for all purposes.

Prices below those of any other steam pump in the market.

WATER METERS. OIL METERS.

PATENT
COLD ROLLED SHAFTING.

The fact that this shafting has 75 per cent. greater strength, a finer finish, and is truer to gauge, than any other in use renders it undoubtedly the most economical. We are also the sole manufacturers of the CELEBRATED COLLINS' PAT. COUPLING, and furnish Pulleys, Hangers, etc., of the most approved styles. Price list mailed on application to JONES & LAUGHLINS,
Try Street, 2d and 3d Avenues, Pittsburg, Pa.
190 S. Canal Street, Chicago, Ill.

☞ Stocks of this shafting in store and for sale by FULLER, DANA & FITZ, Boston, Mass.
Geo. Place Machinery Agency, 121 Chambers St., N. Y.

Trow City Directory for 1880--81,

PRICE $6.

WILSON'S BUSINESS DIRECTORY (second edition), price $3, and **WILSON'S CO-PARTNERSHIP DIRECTORY**, price $3, are now ready.

ALL ORDERS addressed to the **Trow City Directory Company, No. 11 University Place, New York,** promptly attended to.

Do Your Own Printing $3 PRESS prints cards, labels, &c. (Self-inker $4) Larger sizes for larger work. For old or young. Great money saver. A paying business anywhere for all or spare time. Send two stamps for a catalogue of all sizes Presses, Type, Cards, Paper, &c., to the Manufacturers KELSEY & CO., Meriden, Conn.

PROPOSALS FOR MAIL LOCKS AND KEYS.

POST OFFICE DEPARTMENT,
WASHINGTON, D. C., June 22, 1880.

In compliance with a provision in the law entitled "An Act making appropriations for the service of the Post Office Department for the fiscal year ending June 30, 1881, and for other purposes," approved June 11, 1880, requiring a re-advertisement for proposals for Mail Locks and Keys, notice is hereby given that SEPARATE SEALED PROPOSALS will be received at this Department UNTIL 12 O'CLOCK NOON, ON THE SECOND DAY OF AUGUST, 1880, for furnishing five new and different kinds of Locks and Keys for the sole and exclusive use of the United States mails, including, besides those to be used for mail bags, such as are to be used on the street letter-boxes of the United States.

As the public exposure and searching examination necessary to intelligent bidding on any prescribed model of a lock and key would tend to impair, if not entirely destroy, the further utility of all such locks and keys for the purposes of the mails, the Postmaster General prescribes no models or samples for bidders, but relies for a selection on the mechanical skill and ingenuity which a fair competition among inventors, hereby invited, may develop in samples submitted by them.

Proposals, with samples, will also be received at the same time, for Safety Chains for Mail Keys.

Specifications of conditions and requirements as to proposals, samples, kinds and quantities, contracts, etc., as well as forms of proposal, will be furnished on application, by letter, to the Second Assistant Postmaster General. No proposal will be considered, unless it shall have been submitted in accordance with such specifications and forms.

The Contracts which may be made will be in conformity to the specifications and the accepted proposals.

D. M. KEY,
Postmaster General.

TAPS & DIES · VISES · TOOLS · TWIST DRILLS · CHUCKS · MACHINE SCREWS · LATHES · FILES · STEEL TOOLS · STUBS

TOOLS for Machinists, Carpenters, Amateurs, Jewellers, Model Makers, Blacksmiths, etc. *Send for Catalogue,* and state *what kind* of Tools you require. **TALLMAN & McFADDEN,**
607 Market St., Philadelphia, Pa.

Steel Castings

From ¼ to 15,000 lb. weight, true to pattern, of unequaled strength, toughness, and durability. 15,000 Crank Shafts and 10,000 Gear Wheels of this steel now running prove its superiority over all other Steel Castings. Send for circular and price list.
CHESTER STEEL CASTINGS CO., 407 Library St., Phila, Pa.

"The 1876 Injector."

Simple, Durable, and Reliable. Requires no special valves. Send for illustrated circular.
WM. SELLERS & CO., Phila.

STEAM HEATING APPARATUS
LIGHTS PATENTS
24 SIZES OF BOILERS RADIATION 28 PER CENT SUPERIOR TO ANY OTHER.
ADDRESS EUREKA STEAM HEATING CO. ROCHESTER, N.Y.

Shafts, Pulleys, Hangers, Etc.

Full assortment in store for immediate delivery.
WM. SELLERS & CO.,
79 Liberty Street, New York.

---

50 Elegant Bristol CARDS, name in SCRIPT, a fine CARD CASE, Price List, and Terms to Agents, all for 15 cents.
BARROLL & CO., Farmington, Missouri.

VENTILATION. — PARTIES HAVING charge of churches, schools, etc., or any one in need of ventilation, will find the Wing Fan Ventilator the best. See SCI. AM., Jan. 31, 1880, or send for circulars.
L. J. Wing or Simonds Mfg. Co., 50 Cliff St., New York.

EXTRA BARGAINS.

Town rights, $10; county, $25. Best novelty yet manufactured. If you want to make money, address, with stamp, J. H. MARTIN, Hartford, N. Y.

GRISCOM & CO'S
VALVE REFITTING MACHINE
POTTSVILLE, PA.

STEAM PUMPS.

THE NORWALK IRON WORKS CO.,
SOUTH NORWALK, CONN.

LARGEST ESTABLISHMENT OF THE KIND IN THE WORLD.

MOSS ENGRAVING CO.,

J. C. MOSS, Pres't and Supt.
R. B. MOSS, Ass't Supt.
M. A. MOSS, Treas.

Incorporated April 2, 1880.
Moss's New Process.

J. E. RAMSEY, Secretary.
H. A. JACKSON, Ass't Secy.

535 PEARL ST., near Broadway, NEW YORK.

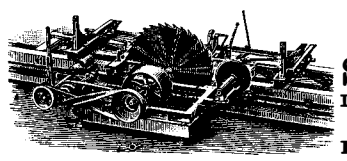
Important to Manufacturers and Publishers:

Engraved Plates for Newspaper, Book, and Catalogue Illustration executed in Type Metal in a superior manner by a new and improved Photo-Chemical method, from all kinds of Prints, Pen Drawings, Photographs, Tintypes, Original Designs, Pencil Sketches, and when available from the object itself. *Much cheaper than wood cuts* These plates are mounted type high ready for use on any ordinary press, and are guaranteed to be fully equal to the best wood cuts. Electrotypes can be made from them in the usual manner. We also have a fully equipped steam electrotyping department. Engravings of Portraits, Landscapes, Buildings, Machinery, and miscellaneous engraving of all kinds executed in the highest style of the art at reasonable prices.

Mr. J. C. MOSS in withdrawing from the Photo-Engraving Co., 67 Park Place, has retained for himself all improvements made and used by him in Photo-Engraving since May, 1872.

Our motto is: "The best work at low prices, always on time." Send stamp for illustrated circular. Send copy for estimate. Please mention this paper.

SPECIAL.—JUST ISSUED A CIRCULAR OF PORTRAITS OF PRESIDENTIAL CANDIDATES, FIVE SIZES. SEND STAMP. PLATES FOR SALE.



THE STEARNS MANUFACTURING CO.,

ERIE, PENNSYLVANIA, make a specialty of improved

SAW MILL MACHINERY.

Designed in its construction for producing lumber economically and rapidly. Plans and estimates for Mills of any capacity furnished on request. Also build

ENGINES, BOILERS, AND MACHINERY IN GENERAL.

AGENTS WANTED.

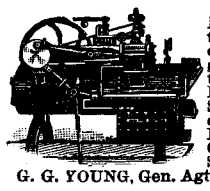
We want agents to sell the **WORLD RENOWNED**

WILSON SEWING MACHINES

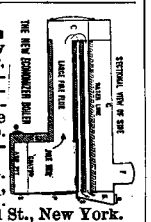
in unoccupied territory. We are prepared to offer inducements that will pay from **One to Six Thousand Dollars a year.** For further particulars, address, stating business experience,

WILSON SEWING MACHINE COMPANY,
Chicago, Ill.

PORTER MANUF'G CO.



The New Economizer, the only Agricultural Engine with Return Flue Boiler in use. Send for circular to PORTER MFG. Co., Limited, Syracuse, N.Y.



G. G. YOUNG, Gen. Agt., 42 Cortland St., New York.

ROOFING.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents Wanted. T. NEW, 32 John Street, New York.

WANTED—A THOROUGHLY COMPETENT man who understands steam and pipe and machine work, to act as salesman and to estimate on work in the South. Address A. B., Box 773, New York, giving address and references.

The attention of Architects, Engineers, and Builders is called to the great decline in prices of wrought

STRUCTURAL IRON.

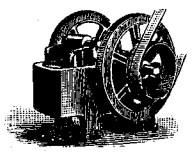
It is believed that were owners fully aware of the small difference in cost which now exists between iron and wood, the former, in many cases, would be adopted, thereby saving *insurance* and avoiding all risk of *interruption to business* in consequence of fire. Book of detailed information furnished to Architects, Engineers, and Builders, on application.

SPARE THE CROTON AND SAVE THE COST.

Driven or Tube Wells

furnished to large consumers of Croton and Ridgewood Water. WM. D. ANDREWS & BRO., 235 Broadway, N.Y., who control the patent for Green's American Driven Well.

CIVIL, MECHANICAL, AND MINING ENGINEERING at the Rensselaer Polytechnic Institute, Troy, N.Y. The oldest engineering school in America. Next term begins September 16th. The Register for 1880 contains a list of the graduates for the past 54 years, with their positions; also, course of study, requirements, expenses, etc. Address
DAVID M. GREENE, Director.



THE BLAKE "LION AND EAGLE" CRUSHER,

A patented improvement of the former "New Pattern" Blake machine. Has much greater efficiency than the old. It requires only about half the power to drive, and is transported at much less expense (the size most used weighing several thousand pounds less than the unimproved machine). It requires less than half the time in oiling and other manipulation, and less than half the expense for repairs. Address
E. S. BLAKE & CO., Pittsburgh, Pa.,
Sole Proprietors and Manufacturers.

Pond's Tools,

Engine Lathes, Planers, Drills, &c.

DAVID W. POND, Worcester, Mass.

THE BOARD OF WATER COMMISSIONERS, of the City of Yonkers, invite sealed proposals for a pumping engine of 3½ million gallons capacity. Bids to be opened July 19, 1880. For particulars, apply to W. W. WILSON, Engineer and Superintendent Yonkers Water Works.

ALAND'S
Silent Injector, Blower & Exhauster.
Apply to
S. ALAND,
Rome, Oneida Co., N. Y.

MACHINISTS' TOOLS.

NEW AND IMPROVED PATTERNS.
Send for new illustrated catalogue.

Lathes, Planers, Drills, &c.

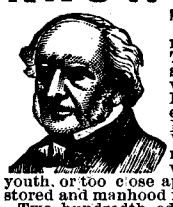
NEW HAVEN MANUFACTURING CO.,
New Haven, Conn.

---

14 STOP ORGANS,

SUB BASS and Oct. Coupler, 4 Set Reeds, $65.
Pianos, $125 and upwards, sent on trial. Catalogue free. Address DANIEL F. BEATTY, Washington, N. J.

KNOW THYSELF.



THE untold miseries that result from indiscretion in early life may be alleviated and cured. Those who doubt this assertion should purchase the new medical work published by the PEABODY MEDICAL INSTITUTE, Boston, entitled **THE SCIENCE OF LIFE; or, SELF-PRESERVATION.** Exhausted vitality, nervous and physical debility, or vitality impaired by the errors of youth, or too close application to business, may be restored and manhood regained.

Two hundredth edition, revised and enlarged, just published. It is a standard medical work, the best in the English language, written by a physician of great experience, to whom was awarded a gold and jeweled medal by the National Medical Association. It contains beautiful and very expensive engravings. Three hundred pages, more than 50 valuable prescriptions for all forms of prevailing disease, the result of many years of extensive and successful practice, either one of which is worth ten times the price of the book. Bound in French cloth; price only $1, sent by mail, postpaid.

The London *Lancet* says: "No person should be without this valuable book. The author is a noble benefactor."

An illustrated sample sent to all on receipt of 6 cents for postage.

The author refers, by permission, to Hon. P. A. BISSELL, M.D., prest. of the National Medical Association. Address Dr. W. H. PARKER, No. 4 Bulfinch Street, Boston, Mass. The author may be consulted on all diseases requiring skill and experience.

HEAL THYSELF.

THE HOLLY SYSTEM OF STEAM HEATING CO. LIMITED
FOR CITIES AND VILLAGES. HOLLY STEAM COMBINATION CO. LOCKPORT N.Y.
SEE ILLUSTRATED AD. IN LAST NUMBER.

A
B

RUBBER BACK SQUARE PACKING.

BEST IN THE WORLD.

For Packing the Piston Rods and Valve Stems of Steam Engines and Pumps.

B represents that part of the packing which, when in use, is in contact with the Piston Rod.

A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam-tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from ¼ to 2 inches square.

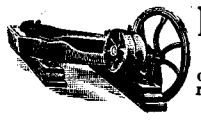
JOHN H. CHEEVER, Treas. NEW YORK BELTING & PACKING CO., 37 & 38 Park Row, New York.

BUCKET PLUNGER STEAM PUMPS,

FOR EVERY DUTY.

VALLEY MACHINE CO.,

EASTHAMPTON, MASS.



Forster's Rock & Ore Breaker and Combined Crusher and Pulverizer.

The simplest machine ever devised for the purpose.

Parties who have used it constantly for six years testify that it will do *double* the work of *any other Crusher*, with one-third the Power, and one-half the expense for keeping in repair. The smaller sizes can be run with Horse Power.
Address TOTTEN & CO., Pittsburgh Pa.

1880. 1880.

Pittsburgh Exposition Society.

THE FOURTH

EXPOSITION AND FAIR

Will open to the public Thursday, September 2, and remain open day and evening (Sundays excepted) until Saturday, October 9th, 1880.

Blank forms of application for space, Prospectus, and Premium list may be had by addressing the secretary.

Exhibitors are earnestly requested to make early application for space, thus enabling the managers to better arrange the whole Exhibition.

New Machinery Hall; new Engine and Boilers.

Manufacturers and Inventors should avail themselves of the unsurpassed facilities offered by this Exposition for the introduction of new machinery to the public.

Office, GERMANIA BANK BUILDING, 89 Wood St.
P. O. BOX 895, PITTSBURGH, PA.

E. P. YOUNG, General Manager. J. C. PATTERSON, Secretary.
JOHN D. BAILEY, Asst. Manager and Cashier.

FOUR SIDED MOULDER, WITH OUT-side bearing. We manufacture 5 sizes of these moulders.

Also Endless Bed Planers, Mortisers and Borers. Tenoning Machines, Sash Dovetailers, Blind Rabbeting Machines. Also a large variety of other wood working machines.
Address
LEVI HOUSTON, Montgomery, Pa.

CENTENNIAL AND PARIS MEDALS.

Mason's Friction Clutches and Elevators.

"New and Improved Patterns."
VOLNEY W. MASON & CO., Providence, R. I., U. S. A.

Wood-Working Machinery,

Such as Woodworth Planing, Tonguing, and Grooving Machines, Daniel's Planers, Richardson's Patent Improved Tenon Machines, Mortising, Moulding, and Re-Saw Machines. Eastman's Pat. Miter Machines, and Wood-Working Machinery generally. Manufactured by
WITHERBY, RUGG & RICHARDSON,
26 Salisbury Street, Worcester, Mass.
(Shop formerly occupied by R. BALL & CO.)

JOHN R. WHITLEY & CO.

European Representatives of American Houses, with First-class Agents in the principal industrial and agricultural centers and cities in Europe. London, 7 Poultry, E. C. Paris, 8 Place Vendôme. Terms on application. J. R. W. & Co. purchase Paris goods on commission at shippers' discounts.

CAVEATS, COPYRIGHTS, LABEL REGISTRATION, ETC.

Messrs. Munn & Co., in connection with the publication of the SCIENTIFIC AMERICAN, continue to examine Improvements, and to act as Solicitors of Patents for Inventors.

In this line of business they have had OVER THIRTY YEARS' EXPERIENCE, and now have *unequaled facilities* for the Preparation of Patent Drawings, Specifications, and the Prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Registration of Labels, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business intrusted to them is done with special care and promptness, on very moderate terms.

We send free of charge, on application, a pamphlet containing further information about Patents and how to procure them; directions concerning Labels, Copyrights, Designs, Patents, Appeals, Reissues, Infringements, Assignments, Rejected Cases, Hints on the Sale of Patents, etc.

Foreign Patents.—We also send, *free of charge*, a Synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world. American inventors should bear in mind that, as a general rule, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five patents—embracing Canadian, English, German, French, and Belgian—will secure to an inventor the exclusive monopoly to his discovery among about ONE HUNDRED AND FIFTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The expense to apply for an English patent is $75; German, $100; French, $100; Belgian, $100; Canadian, $50.

Copies of Patents.—Persons desiring any patent issued from 1836 to November 20, 1866, can be supplied with official copies at reasonable cost, the price depending upon the extent of drawings and length of specifications.

Any patent issued since November 20, 1866, at which time the Patent Office commenced printing the drawings and specifications, may be had by remitting to this office $1.

A copy of the claims of any patent issued since 1836 will be furnished for $1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention, and date of patent.

A pamphlet, containing full directions for obtaining United States patents sent free. A handsomely bound Reference Book, gilt edges, contains 140 pages and many engravings and tables important to every patentee and mechanic, and is a useful hand book of reference for everybody. Price 25 cents, mailed free.

Address
MUNN & CO.,
Publishers SCIENTIFIC AMERICAN,
37 Park Row, New York.
BRANCH OFFICE—Corner of F and 7th Streets, Washington, D. C.

© 1880 SCIENTIFIC AMERICAN, INC

Advertisements.

Inside Page, each insertion --- 75 cents a line.
Back Page, each insertion --- $1.00 a line.
(About eight words to a line.)

Engravings may head advertisements at the same rate per line, by measurement, as the letter press. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

☞ The publishers of this paper guarantee to advertisers a circulation of not less than 50,000 copies every weekly issue.

THE NEW YORK BELTING AND PACKING COMPANY
LOOK FOR OUR STAMP
on the goods whenever you buy
BELTING, HOSE, OR PACKING.
37 & 38 PARK ROW, NEW YORK.

TO INVENTORS AND MANUFACTURERS

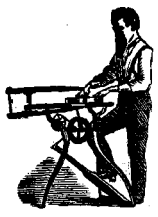
The 49th Exhibition of the American Institute will open September 15. Heavy machinery will be received August 23; other goods, September 6. For blanks and information, address
GENERAL SUPERINTENDENT,
AMERICAN INSTITUTE, NEW YORK CITY.

ERICSSON'S NEW MOTOR.
ERICSSON'S
New Caloric Pumping Engine,
FOR
DWELLINGS AND COUNTRY SEATS.
Simplest, cheapest, and most economical pumping engine for domestic purposes. Any servant girl can operate. Absolutely safe. Send for circulars and price lists.
DELAMATER IRON WORKS
C. H. DELAMATER & CO., Proprietors,
No. 10 Cortlandt Street, New York, N. Y.

PREVENT SLIPPING. The handsomest, as well as the *safest* Carriage Step made. Forged from best iron, and formed with a sunken panel, in which is secured a plating of richly moulded rubber. Durability warranted. Send for illustrated circular.
Rubber Step M'f'g Co., Boston, Mass.

Mill Stones and Corn Mills.
We make Burr Millstones, Portable Mills, Smut Machines, Packers, Mill Picks, Water Wheels, Pulleys, and Gearing specially adapted to Flour Mills. Send for catalogue.
J. T. NOYE & SONS, Buffalo, N. Y.

The New York Ice Machine Company,
21 COURTLANDT STREET. ROOM 54.
Low Pressure Binary Absorption System.
Advantages over all other Machines.
Makes 25 per cent. more Ice. Uses only ¼ water of condensation. No Pressure at rest. Pressure in running, 14 pounds. Self-lubricating. No Leaks, non-inflammable. No action on Metals. Easy Attendance. Machines and production are guaranteed by C. H. Delamater & Co.


BARNES' PATENT FOOT POWER MACHINERY.
CIRCULAR SAWS, SCROLL SAWS, LATHES, FORMERS, MORTISERS, TENONERS, &c., for actual workshop business.
COMPLETE OUTFITS for Mechanics and Amateurs.
MACHINES ON TRIAL IF DESIRED.
Say where you read this, and send for Descriptive Catalogue and Price List. W. F. & JOHN BARNES, Rockford, Ill.

BOILER COVERINGS.
Plastic Cement and Hair Felt, with or without the Patent **"AIR SPACE"** Method.
ASBESTOS MATERIALS,
Made from pure Italian Asbestos, in fiber, mill board, and round packing. THE CHALMERS-SPENCE CO., 40 John Street, and Foot of E. 9th Street, New York.

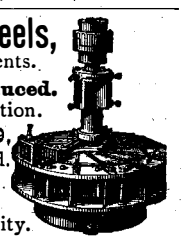
H.W.JOHNS' ASBESTOS
LIQUID PAINTS, ROOFING, BOILER COVERINGS, Steam Packing, Sheathings, Fireproof Coatings, Cements,
SEND FOR SAMPLES, ILLUSTRATED PAMPHLET, AND PRICE LIST.
H. W. JOHNS M'F'G CO., 87 MAIDEN LANE, N. Y.

POWER SHEARS.
STILES & PARKER PRESS CO., Middletown, Conn.

Pictet Artificial Ice Co., Limited,
P. O. Box 3083. 142 Greenwich St., New York.
Guaranteed to be the most *efficient* and *economical of all* existing Ice and Cold Air Machines.

STUTTERING CURED by Bates' Appliances. Send for description to SIMPSON & Co., Box 2236, New York.

Leffel Water Wheels,
With recent improvements.
Prices Greatly Reduced.
8000 in successful operation.
FINE NEW PAMPHLET FOR 1879,
Sent free to those interested.
James Leffel & Co.,
Springfield, O.
110 Liberty St., N. Y. City.



Perfectly Smooth, Thoroughly Seasoned
CUT THIN LUMBER!!
Manufactured by our Patent Board Cutting Machines and Seasoning Presses.
Pronounced the only Perfect Cut Lumber!!
MAHOGANY,
Rosewood, Satinwood, Walnut, Ash, Red Cedar, Cherry, Oak, Poplar, Maple, Holly, French Walnut, etc., etc., in Logs, Planks, Boards, and Veneers.
Send for catalogue and price lists.
GEO. W. READ & CO.,
186 to 200 Lewis St., foot 5th and 6th Sts., New York.

THE "NEW" PULSOMETER STEAM PUMP.

The attention of mechanics and engineers is particularly invited to what is said of our "New" and improved Pump, on page 69 of this paper, with the illustrations descriptive of the same on the first page. Note, also, what is said of the Pulsometer by a few of many representative houses. Send for a descriptive book on the New Pulsometer.

83 JOHN ST., NEW YORK.

CITY ENGINEER'S OFFICE, No. 11 City Hall, Worcester, Mass. March 18, 1880.
PULSOMETER STEAM PUMP CO.
We have one of your No. 5 New Pulsometers, which we have used in various places, on sewer and other work, and it has always worked to perfection under all circumstances. I believe it will do all you claim for it, and more too. C. A. ALLEN, City Engineer.

WEYMOUTH PAPER MILLS, Bloomfield, N. J., Feb. 20, 1880.
PULSOMETER STEAM PUMP CO.
We have had one of your No. 7 New Pulsometers in use for some months, working day and night, and, so far, are much pleased with it. Very respectfully,
ROBERT FULTON.

TUNXIS WORSTED MILLS, Poquonnock, Conn., Feb. 23, 1880.
PULSOMETER STEAM PUMP CO.
The No. 5 New Pulsometer you furnished us has far exceeded our expectations, and has been of great value to us. We would not be without it. Yours very truly,
S. METCALFE, Supt.

MCHENRY COAL CO., McHenry, Ohio Co., Ky., Feb. 23, 1880.
PULSOMETER STEAM PUMP CO.
We have been using one of your No. 7 New Pulsometer Pumps in our mines for about three years. We lift the water 10 feet and force it 15 feet. It throws more water than any pump I ever saw, and I heartily recommend it to any one who wants a good pump, with no machinery to get out of repair. Yours truly,
W. G. DUNCAN, Supt.

OFFICE OF CHARLES PFIZER & CO., Chemists, 81 Maiden Lane, N. Y.
We have seven of your Pulsometer Pumps in use, and they give us entire satisfaction.
CHARLES PFIZER & CO.

HOWARD IRON WORKS, Howard, Centre Co., Pa., Feb. 20, 1880.
PULSOMETER STEAM PUMP CO.
I take pleasure to say that the No. 5 New Pulsometer purchased from you last summer has given entire satisfaction in its working as a pump, and I cheerfully recommend the Pulsometer to any one desirous of using a steam pump, as one that is economical in its working, and reliable. Yours truly,
BERNARD LAUTH, Proprietor.

OFFICE OF GARNER & CO., Nos. 2, 4, 6, 8 and 10 Worth street.
PULSOMETER STEAM PUMP CO.
GENTLEMEN: We have several of your Pulsometers in use, and they are doing good work, and we can with pleasure recommend them. Yours truly,
GARNER & CO.

NORTHUMBERLAND IRON AND NAIL WORKS, Northumberland, Pa., May 10, 1880.
THE PULSOMETER STEAM PUMP CO.
GENTS: The No. 4 Pulsometer, with 9 feet of 2½ pipe as suction and 12 feet of 2½ inch as discharge, worked by ¼ inch steam pipe, continues to work to our entire satisfaction, requiring no attention, and discharges constantly a 2½ inch stream, from Monday morning until Saturday noon, when we stop the supply of steam.
Yours truly, VAN ALEN & Co.

BROWN & BROTHERS, Waterbury, Conn., May 12, 1880.
PULSOMETER STEAM PUMP CO.
GENTLEMEN: Having used one of your No. 5 Pulsometers for a period of more than six years, for raising water about thirty-five feet, we would say that we consider it the best pump that we have ever used. Yours respectfully, BROWN & BROTHERS,
per E. L. Frisbee, Supt.

THE BAKER BLOWER
Centennial Judges Report.
"Good Design and Material. Very efficient in action. With the special advantages that they can be connected for motion directly with engine without the use of gearing or belting."
SEND FOR CATALOGUE.
WILBRAHAM BROS.
No. 2318 Frankford Avenue,
PHILADELPHIA, PA.

WM. A. HARRIS,
PROVIDENCE, R. I. (PARK STREET),
Six minutes walk West from station.
Original and Only builder of the
HARRIS-CORLISS ENGINE
With Harris' Patented Improvements, from 10 to 1,000 H. P.

A PLANING MILL OUTFIT FOR SALE very low for cash. Will sell all together or each machine separate. All first-class machines, good order.
J. H. KERRICK & CO., Indianapolis, Ind.

TELEGRAPH and Electrical Supplies. Send for Catalogue.
C. E. JONES & BRO., CINCINNATI, O.

WOOD SOLE SHOES.
The cheapest, most durable, warm, good looking, and thoroughly waterproof shoe. Particularly adapted to Brewers, Miners, and all classes of laborers. Send stamp for circular and price list.
CHAS. W. COPELAND,
122 Summer St., Boston, Mass.

BUY NO BOOTS OR SHOES
Unless the soles are protected from wear by *Goodrich's Bessemer Steel Rivets. Guaranteed to outwear any other sole.* All dealers sell these boots. Taps by mail for 50 cents in stamps. Send paper pattern of size wanted.
H. C. GOODRICH, 19 Church St., Worcester, Mass.

MICROSCOPES and every description of Optical Instruments, the best and the cheapest. Send for Illustrated Priced Catalogues.
R. & J. BECK,
Manufacturing Opticians, Philadelphia, Pa.

J. STEVENS & CO.,
P. O. Box 28, Chicopee Falls, Mass.
Manufacturers of Stevens' Patent Breech-Loading Sporting and Hunters' Pet Rifles, Single and Double Barrel Shot Guns, Pocket Rifles, Pocket Shot Guns, Gallery Rifles, Superior Spring Calipers and Dividers, including the New Patent Coil Spring Calipers; also Double Lip Countersinks and Hathaways' Patent Combination Gauge.

BOGARDUS' PATENT UNIVERSAL ECCENTRIC MILLS—For grinding Bones, Ores, Sand, Old Crucibles, Fire Clay, Guanos, Oil Cake, Feed, Corn, Corn and Cob, Tobacco, Snuff, Sugar, Salts, Roots, Spices, Coffee, Cocoanut, Flaxseed, Asbestos, Mica, etc., and whatever cannot be ground by other mills. Also for Paints, Printers' Inks, Paste Blacking, etc. JOHN W. THOMSON, successor to JAMES BOGARDUS, corner of White and Elm Sts., New York.

THE MACKINNON PEN OR FLUID PENCIL.

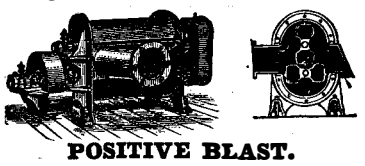
Particulars mailed Free.
MACKINNON PEN CO.,
200 Broadway, near Fulton St., N. Y.

HARTFORD
STEAM BOILER
Inspection & Insurance
COMPANY.
W. B. FRANKLIN, V. Pres't. J. M. ALLEN, Pres't.
J. B. PIERCE, Sec'y.

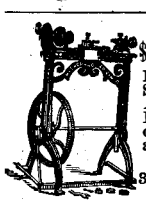
THE WATSON PUMP FOR ARTESIAN OR DEEP WELL. PUMPING PISTON ROD, PLUNGER & WELL ROD IN DIRECT LINE. MACHINE SIMPLE, EFFICIENT. JAMES WATSON 1608 S. FRONT ST. PHILA.

FRIEDMANN'S PATENT INJECTOR,
The best
BOILER FEEDER
In the world.
Simple, Reliable, and Effective.
40,000 IN ACTUAL USE.
NATHAN & DREYFUS,
Sole Manufacturers, *NEW YORK.*
Send for Descriptive Catalogue.

ROOTS' NEW IRON BLOWER.


POSITIVE BLAST.
IRON REVOLVERS, PERFECTLY BALANCED
IS SIMPLER, AND HAS
FEWER PARTS THAN ANY OTHER BLOWER.
P. H. & F. M. ROOTS, Manuf'rs,
CONNERSVILLE, IND.

S. S. TOWNSEND, Gen. Agt., 6 Cortlandt St., 8 Dey Street,
WM. COOKE, Selling Agt., 6 Cortlandt Street,
JAS. BEGGS & CO., Selling Agts., 8 Dey Street,
} NEW YORK.
SEND FOR PRICED CATALOGUE.


SHEPARD'S CELEBRATED
$50 Screw Cutting Foot Lathe.
Foot and Power Lathes, Drill Presses, Scrolls, Circular and Band Saws, Saw Attachments, Chucks, Mandrels, Twist Drills, Dogs, Calipers, etc. Send for catalogue of outfits for amateurs or artisans.
H. L. SHEPARD & CO.,
331, 333, 335, & 337 West Front Street,
Cincinnati, Ohio.

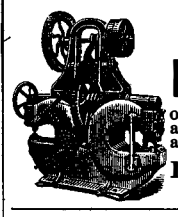
HEKTOGRAPH

Patents for the process of Dry Copying have been issued to us, dated May 18 and June 1, 1880. The Hektograph is now the only gelatine copying pad which can be manufactured, used, or sold, without infringing our patents. All infringements will be prosecuted to the full extent of the law.
HEKTOGRAPH CO., 22 and 24 Church Street, New York.

Pyrometers, For showing heat of Ovens, Hot Blast Pipes, Boiler Flues, Superheated Steam, Oil Stills, etc.
HENRY W. BULKLEY, Sole Manufacturer,
149 Broadway, N. Y.

COLUMBIA BICYCLE.
A practical road machine. Indorsed by the medical profession as the most healthful of outdoor sports. Send 3 cent stamp for 24 page catalogue, with price list and full information, or 10 cents for catalogue and copy of *The Bicycling World.*
THE POPE M'F'G CO.,
89 Summer Street, Boston, Mass.

The Asbestos Packing Co.,
Miners and Manufacturers of Asbestos,
BOSTON, MASS.,
OFFER FOR SALE:
PATENTED ASBESTOS ROPE PACKING,
" " LOOSE "
" " JOURNAL "
" " WICK "
" " MILL BOARD,
" " SHEATHING PAPER,
" " FLOORING FELT.
" " CLOTH.


FOR A
COMBINED
Punch and Shears
of beautiful design, of great strength and capacity, and thoroughly reliable, address
Lambertville Iron Works,
LAMBERTVILLE, N. J.

The George Place Machinery Agency
Machinery of Every Description,
121 Chambers and 103 Reade Streets, New York.

Metallic Shingles
Make the most DURABLE and ORNAMENTAL ROOF in the world. Send for descriptive circular and new prices to
IRON CLAD MANUFACTURING CO.,
22 CLIFF STREET, NEW YORK.

BROWN'S PAT. SPLIT Shafts, Hangers, PULLEYS
At low prices. Largest assortment. A. & F. BROWN, 57, 59, & 61 Lewis St., New York.

OF THE
Scientific American
FOR 1880.
The Most Popular Scientific Paper in the World.
VOLUME XLIII. NEW SERIES.
Only $3.20 a Year, including postage. Weekly. 52 Numbers a Year.

This widely circulated and splendidly illustrated paper is published weekly. Every number contains sixteen pages of useful information, and a large number of original engravings of new inventions and discoveries, representing Engineering Works, Steam Machinery, New Inventions, Novelties in Mechanics, Manufactures, Chemistry, Electricity, Telegraphy, Photography, Architecture, Agriculture, Horticulture, Natural History, etc.

All Classes of Readers find in THE SCIENTIFIC AMERICAN a popular *resume* of the best scientific information of the day; and it is the aim of the publishers to present it in an attractive form, avoiding as much as possible abstruse terms. To every intelligent mind, this journal affords a constant supply of instructive reading. It is promotive of knowledge and progress in every community where it circulates.

Terms of Subscription.—One copy of THE SCIENTIFIC AMERICAN will be sent for *one year*—52 numbers—postage prepaid, to any subscriber in the United States or Canada, on receipt of **three dollars and twenty cents** by the publishers; six months, $1.60; three months, $1.00.

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis *for every club of five subscribers* at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

One copy of THE SCIENTIFIC AMERICAN and one copy of THE SCIENTIFIC AMERICAN SUPPLEMENT will be sent for one year, postage prepaid, to any subscriber in the United States or Canada, on receipt of *seven dollars* by the publishers.

The safest way to remit is by Postal Order, Draft, or Express. Money carefully placed inside of envelopes, securely sealed, and correctly addressed, seldom goes astray, but is at the sender's risk. Address all letters and make all orders, drafts, etc., payable to

MUNN & CO.,
37 Park Row, New York.

To Foreign Subscribers.—Under the facilities of the Postal Union, the SCIENTIFIC AMERICAN is now sent by post direct from New York, with regularity, to subscribers in Great Britain, India, Australia, and all other British colonies; to France, Austria, Belgium, Germany, Russia, and all other European States; Japan, Brazil, Mexico, and all States of Central and South America. Terms, when sent to foreign countries, Canada excepted, $4, gold, for SCIENTIFIC AMERICAN, 1 year; $9, gold, for both SCIENTIFIC AMERICAN and SUPPLEMENT for 1 year. This includes postage, which we pay. Remit by postal order or draft to order of Munn & Co., 37 Park Row, New York.

THE "Scientific American" is printed with CHAS. ENEU JOHNSON & CO.'S INK. Tenth and Lombard Sts., Philadelphia, and 50 Gold St. New York.

© 1880 SCIENTIFIC AMERICAN, INC